GAYMAR®

PLEXUS®

O_2Zoned™

MULTI-FUNCTIONAL PORTABLE ROTATION SYSTEM

- **C4000 Series Control Unit**
- **M4000 or M4001 Series Mattress**

Service Manual

PN 100373-000 6/07

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Important - Before using the O_2Zoned System, please read and understand the operator's manual and all safety precautions prior to each application. For assistance, contact Gaymar's technical service department.

Direct: (716) 662-2551

Toll Free (800) 828-7341

Fax: (716) 662-8795

1 Symbols and Definitions

Attention, consult accompanying documents.

Type BF equipment

Protective earth

Dangerous voltage

POST Power On Self Test

[CTRL] Key board Control key on external PC

PCB Printed Circuit Board

2 Safety Precautions:

Review the following precautions prior to using the P4000/P4001 O_2Zoned System.

DANGER

- Risk of electric shock. Refer servicing to qualified service personnel.

WARNING

- Always perform the FUNCTIONAL CHECK and SAFETY INSPECTION after making repairs and before returning the unit to patient use. Document your findings on the INSPECTION FORM. Improper repair may result in injury, equipment damage, or malfunction.
- Repairs should be performed by qualified medical equipment service personnel in accordance with this manual. Otherwise damage to the O_2Zoned system and improper therapy may result.
- Use only approved replacement parts. Use of substitute parts could lead to unit malfunction or patient injury.

CAUTION

- For grounding reliability, plug only into a properly grounded outlet.
- Make certain all mattress straps are secured to the bed frame to prevent mattress from sliding and causing patient injury.
- Do not block air intake on control unit.
- When disconnecting, and connecting the circuit boards, observe polarity on the ribbon cable connector between Display board and Main PCB. Failure in proper connection of this cable will result in damage to the display board.

3 Repair Policy

For customers who repair Plexus units at their location, this manual contains information to allow a qualified biomedical technician to make necessary repairs.

Limited Warranty

The control unit is warranted free of defects in material and workmanship under normal use and operation for a period of one year, under the terms and conditions of the warranty in place at time of purchase. During the warranty period, Gaymar will repair or replace at its sole option, free of charge, any defective parts or products returned with prior authorization prepaid to Gaymar. Consumable items such as filters are excluded. The full warranty is available from Gaymar upon request.

Warranty does not cover products abused, misused, or altered outside the factory. There are no obligations on the part of Gaymar for consequential damages arising out of or in connection with the use or performance of this product. Gaymar disclaims all implied warranties, including, but not limited to, the implied warranties of merchantability and of fitness for a particular purpose.

In-Warranty Repairs: All in-warranty field repairs must be authorized by Gaymar before proceeding.

Out-of-Warranty Repairs: If the unit becomes inoperative and the cause cannot be determined, the complete unit may be returned to the factory for servicing at the purchaser's expense. Please contact Gaymar to obtain a returned goods ("RG") number prior to returning equipment.

Return Authorization: Please contact your local dealer or Gaymar customer service.

Direct: (716) 662-2551
Toll Free (800) 828-7341
Fax: (800) 993-7890

4 Specification: Control Unit

Enclosure Dimensions	10" x 12" x 6" (25 cm x 30 cm x 16 cm)
Weight	17 pounds
Power Cord	Detachable 14' minimum, #18 AWG with ground wire
Overcurrent Protection	Primary Two 5 x 20 mm fuses 5A, 250V, T, L
	Secondary Two 5 x 20 mm fuses 2A, 250V, F, L
Input	115 VAC, 60Hz, 5A
Operating Ambient Temperature	60 to 85°F (16 to 29°C)
Classification	Class I grounded equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
	Type BF equipment
	MEDICAL EQUIPMENT, classified with respect to electric shock, fire and mechanical hazards only, in accordance with UL 2601-1, CAN/CSA C22.2 NO.601.1
	IPXO, enclosed equipment without protection against ingress of water.
	Continuous operation
Electromagnetic Compatibility	Meets EN60601-1-2:2001 (CISPR 11 Classified as Class A, Group 1 ISM equipment)

5 Description

The O_2Zoned is a portable mattress system, which incorporates low air loss, alternating pressure and rotational therapy. The modes may be used individually, or in

combination. The system consists of a Control Unit (C4000), and a deep cell low air loss mattress (M4000 or M4001)

The mattress base consists of twenty transverse air cushions and two turning bladders positioned over a convoluted foam base. The air cushions each have a series of calibrated orifices to provide continuous low air loss therapy.

The control unit inflates and maintains the mattress at the optimal fill level based on the user-selected patient weight. The control unit also allows for adjustment of rotation angle and position time.

6 Features

C4000 Control Unit

- Rotation angles independently selectable up to 30 degrees.
- Rotation hold/dwell times adjustable from zero to 95 minutes.
- The most recently entered settings retained when power is removed.
- Rotate pause function.
- Cradle feature to facilitate centering of patient.
- Alternating low pressure therapy (Pulse).
- Max Inflate.
- Soft/Firm Comfort Control.
- Keypad lockout.
- CPR quick release.

M4000/4001 Low Air Loss Mattress

- Orificed air cushions.
- Optional contour cushions.
- Top sheet.
- Dimensions (base model) 80" x 34" x 10"

7 Instructions for use

Operator interface shown below, Refer to operator's manual for additional instructions.

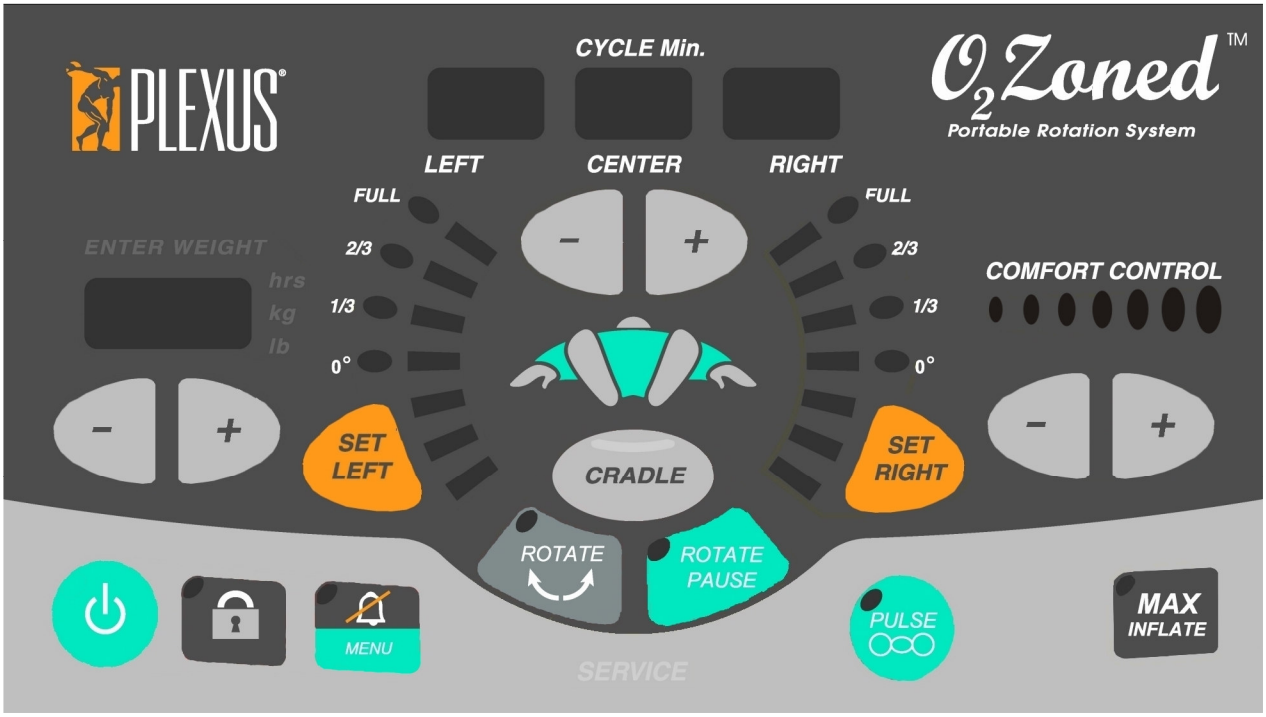


Figure 1 - Control Panel

8 System Maintenance / Functional Check and Safety Inspection

WARNING
Disconnect the C4000 AC power cord from the wall outlet before attempting to clean or maintain the Control Unit.

Maintenance

Enclosure: Examine the enclosure and control panel overlay. They should be clean and free of cracks. Ensure the exterior screws are tight. Check that labeling and markings are clear.

Filter: Visually inspect the air filter for dirt or debris. The filter is located on the back side of the unit, inside the carry handle indent. To inspect, unscrew the finger bolt and remove retaining plate. Extract filter media and wash with mild soap and water. Air dry. Make certain the filter is completely dry before re-installing. A brittle or damaged filter must be replaced. The Air filter should be cleaned at least every 30 days, or more often if determined necessary.

Blower: The blower motor and fan do not require lubrication.

Power Cord: Visually check power cord for damage to cord ends, cracks in the strain relief, and abrasion or cuts in the cord.

Functional Check and Safety Inspection

FUNCTIONAL CHECK and SAFETY INSPECTION – To assure safety after service has been performed on the C4000 control unit it is recommended that the following

testing be performed. This testing should also be performed on a annual basis or more frequently if desired.

Inspection Form - An inspection form is provided in the next section to facilitate and document the inspection process.
Test Equipment - The following test equipment (or equivalent) is required in order to perform the inspection procedures:

- Current Leakage / Ground Resistance Tester
- Inspection form
- Pressure gauge with 0-50 mmHg scale (Gaymar P/N 10391).
- Test hose adapter (Gaymar P/N 11668-000)
- M4000 / M4001 Mattress

Procedures - Perform the following procedures carefully, paying particular attention to test setups. Any deviation from the setups, procedures, or test equipment may result in incorrect or misleading results. Complete Tests 1 – 4 as described. Record results on the inspection form.

Test 1 - Ground Resistance Check: Use a current leakage/ground resistance tester to measure the resistance between the ground pin on the power plug and the hose receptacle on the side of the control unit. The resistance value should not exceed 0.5 ohms. If the resistance exceeds 0.5 ohms, check ground wires (green with yellow stripe) for loose connections.

Test 2 - Current Leakage Test: Measure the maximum earth leakage current. Measure all combinations of line polarity and ground open or closed. Values should not exceed 300 uA

Test 3 – P.O.S.T. and Advanced Self Tests (System self inspection):
NOTE: Connect control unit (C4000) to a M4000 or M4001 mattress;failure to do so may result in errors in post tests or advanced post tests

1. Unplug the system, wait 10 sec. and restore power. The system will execute P.O.S.T. on startup.

P.O.S.T. Test #	Function Tested
1	Control Panel Communications
2	Stuck Key
3	A/P Motor
4	Analog to Digital
5	Blower High Pressure
6	Valves

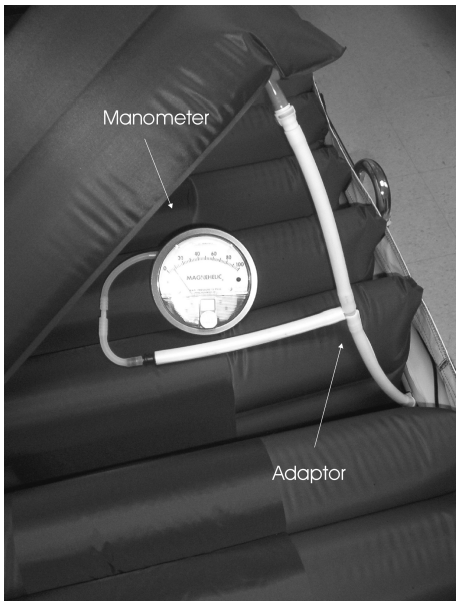
2. To initiate the advanced self test, press and hold the weight decrease and standby key. The system will perform ten tests. Any errors will be displayed in the weight area.

3. In the event of a failure, the alarm will beep and service light flash. An error code will be shown in the weight display area.

NOTE: A list of the error codes is included in the troubleshooting section.

Advanced Self Test #	
0	All LEDs on for 1 Sec.
1	Stuck Key
2	Internal Voltage
4	DAC/ADC Loopback
6	Blower Pressure Sensor
7	Solenoid Valve & Valve Sensors
8	Firmware Checksum
9	System RAM
10	A/P Motor

Test 4 - Pressure tests
Check system pressure control - Set patient weight for 200lbs. (Comfort adjustments must be centered, pulse mode off, no rotation, max inflate off) Measure pressure in cells 9 and 10 as counted from the foot end. The average pressure should be taken from the two cells and meet 19 ½ ± 2 mmHg.



Test Equipment Set 1

Using O^{2}Zoned Mattress

- Connect one pressure gauge in series between the right manifold and a blue air cell in the center of the mattress.
- Connect second pressure gauge in series between the left manifold and an adjacent air cell in the center of the mattress.

9 Inspection Form

C4000 Functional Check and Safety Inspection Form

Serial Number_____ **Location**_____ **Initials**_____ **Date**_____

STEP	PROCEDURE / DESCRIPTION	DONE ✓	ACTION	RESULT PASS/FAIL	
1	Visual Inspection and maintenance.		Check enclosure for cracks	PASS	FAIL
			Check overlays for cracks	PASS	FAIL
			Check screws	PASS	FAIL
			Check labeling and markings	PASS	FAIL
			Clean vents and filter	PASS	FAIL
2	Visual Inspection and maintenance.		Examine plug	PASS	FAIL
			Examine cord	PASS	FAIL
			Check strain relief	PASS	FAIL
3	Test 1		Unplug the unit and measure the ground resistance:_____ ohms. (must be <.5Ω)	PASS	FAIL
4	Test 2		Maximum current leakage reading:		
5	Test 3		Light all LEDs on control panel for 1 sec.	PASS	FAIL
			Stuck key test	PASS	FAIL
			Internal voltage tests	PASS	FAIL
			DAC/ADC loopback test	PASS	FAIL
			Blower pressure sensor test	PASS	FAIL
			Solenoid valve / pressure sensor test	PASS	FAIL
			Firmware checksum test	PASS	FAIL
			System RAM test	PASS	FAIL
			APP motor test	PASS	FAIL
6	Test 4		Pressure at 200 Lb setting:	PASS	FAIL

Notes:

10 Troubleshooting from POST

POST: Flow charts are provided to assist in diagnosing failures from the Power-Up Self Tests (POST). The results of a failed test may be observed on the front panel at the weight display. An error code will be shown when the service light illuminates. Below are the POST and advanced self test codes for each defect.

POST Error Code	Meaning
9.01	Key failure
9.02	Blower pressure failure
9.03	A/P Valve test failure
9.04	Rotation valve failure

Advanced Self Test Error Code	Meaning
1.01	Volt AC Failure
1.02	Volt 5 Failure
1.03	Volt VIN
1.04	Display communication failure
1.05	ROM checksum test
1.06	RAM failure
1.07	ADC failure
1.08	EEPROM failure
1.09	A/P failure

Defect Description	Chart
NO POWER	10.0
DISPLAY TEST	10.1
STUCK KEY TEST	10.2
VOLTAGE TEST	10.3
ADC/DAC TEST	10.4
EEPROM TEST	10.5
BLOWER HIGH PRESSURE TEST	10.6
VALVE TEST	10.7
RAM TEST	10.8
APP MOTOR TEST	10.9

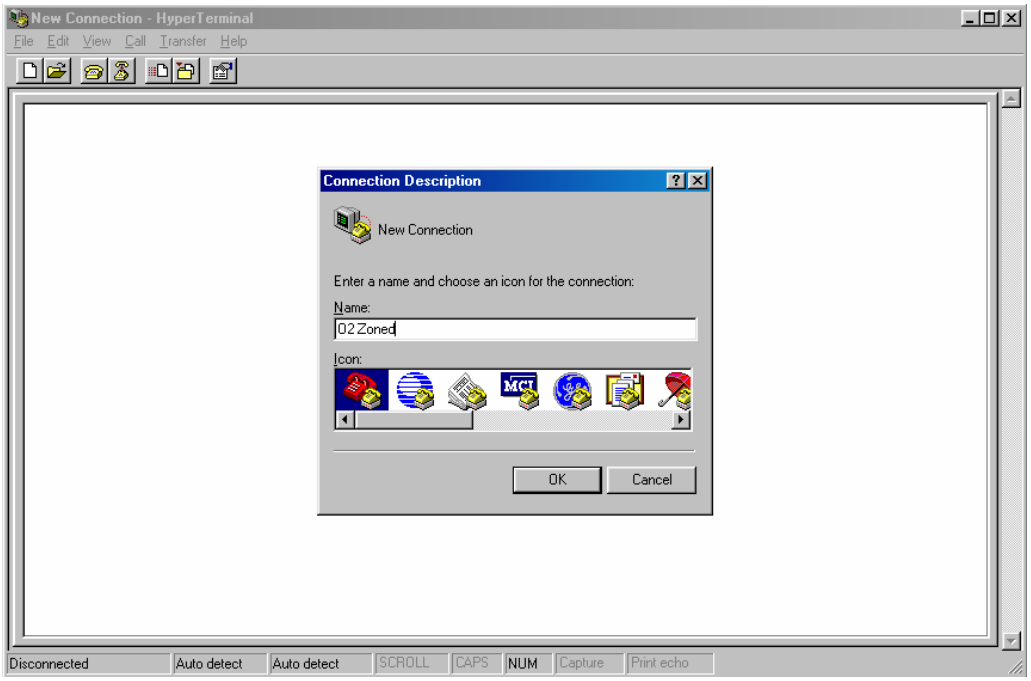
10.1 Optional PC Assisted troubleshooting:

WARNING

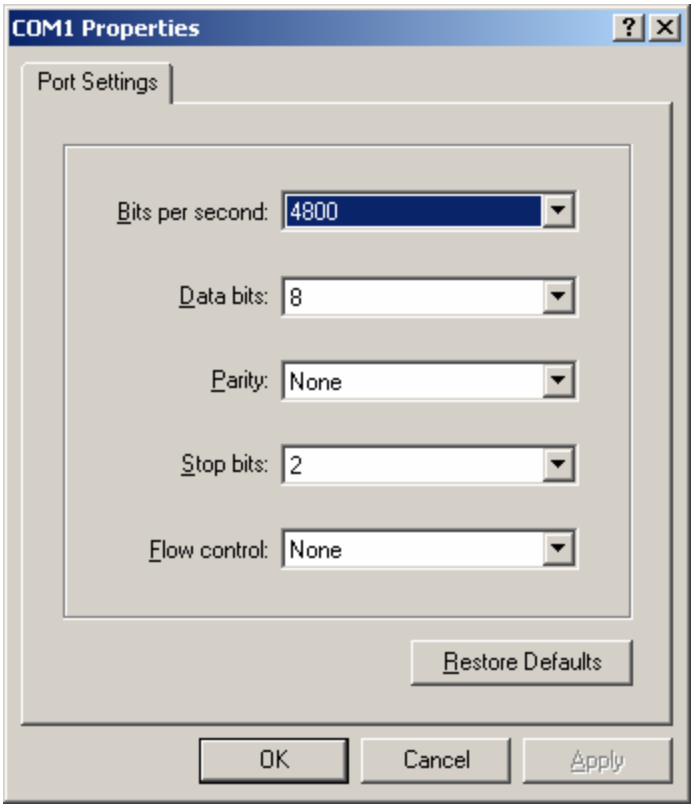
Do not connect or disconnect cables from the main control board when power is applied. Doing so could result in damage to the unit.

The results of a failed test may also be observed with the unit connected to a PC.

Start HyperTerminal™ (or an equivalent communications program, such as ProComm). HyperTerminal™ is built into Microsoft Windows 95, 98, 2000, ME and later operating systems. (See Figure Below)



Configure the program for communication direct to an available COM Port.



The communications program must be configured as follows: 4800 BAUD, 8 data bits, No Parity, 2 stop bits, no flow control. The connection type is “Direct to COM X” (“X” is the number of an available com port on the PC).

Connect unit to computer with interface cable at location J3. The schematic for the communications cable is shown in the figure below.

Power up the control unit, and allow completion of the POST (Power On Self Tests). If the connection is successful, the results of the POST will be displayed on the PC.

Press the [CTRL] key and “D” simultaneously to enter the diagnostic / calibration mode. Serial communication, and diagnostics are now available.

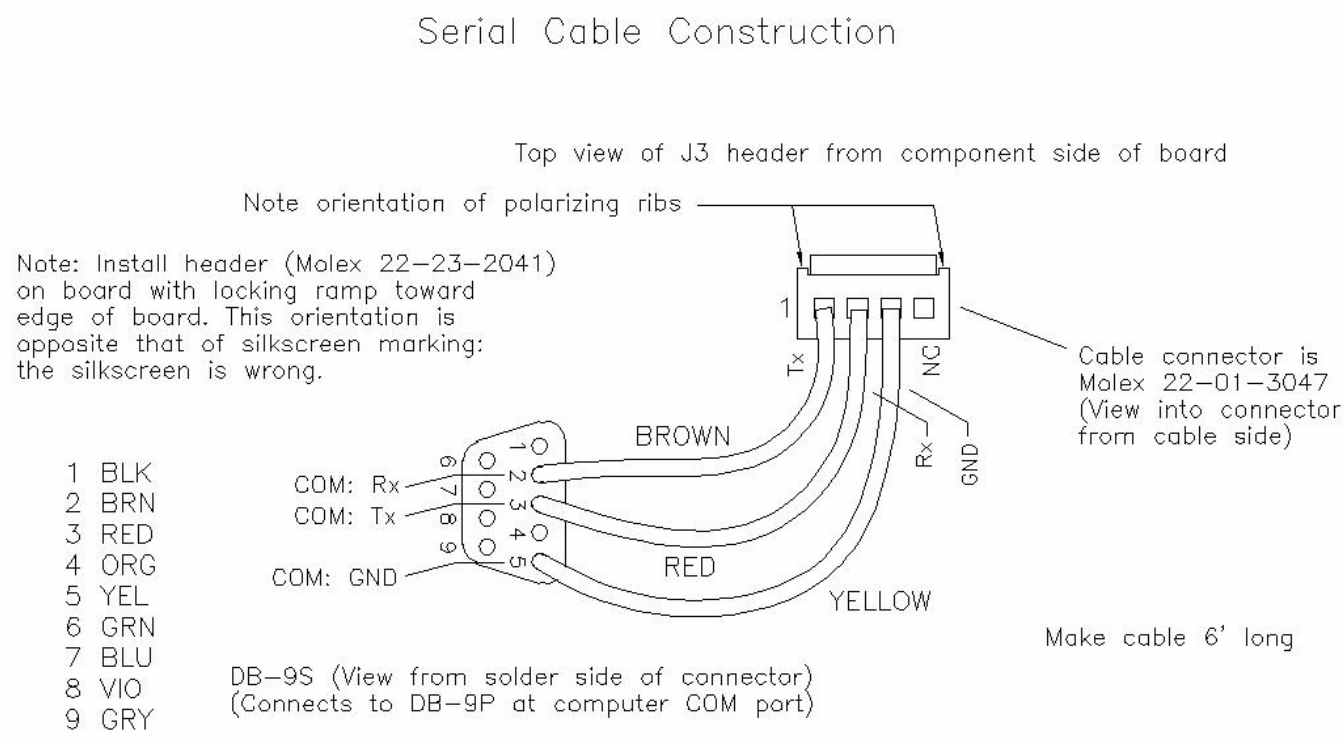


Figure 2 - Communication Cable

10.2 Communication Cable

Fault Codes:

When using the serial communications connection, the user may select option ‘T’ from the diagnostics menu to view any recorded fault codes. The fault codes are shown in table 10.2a.

TABLE 10.2a FAULT CODES FOR THE C4000 (Firmware v2.5 and v3.0.0)

Mot	0	APSens	0	Valves	0	Sys	Code
A/P Motor	# of failures	A/P Sensors	# of failures	Rotation Valve	# of failures	System failures	Code indicates failure

Collect Data:

The collect data option, “U”, at the diagnostic menu (press ‘control-D’ to enter the diagnostic menu), allows additional functional testing to assist in diagnostics. You can monitor pressures and command the blower, valves and APP motor during Collect Data. When Collect Data is selected, the system prints blower and sensor data once per second in the following format:

For the C4000, output lines look like this: 0 RF. RVo LF. LV. 35 21 27 (mmHg 5.6 3.5 3.6)

Column Quick Key

0	RF	RV	LF	LV	35	21	27	(mmHg	5.6	3.5	3.6)
BLOWER SPEED SET	RIGHT FILL	RIGHT VENT	LEFT FILL	LEFT VENT	"RAW" SYSTEM PRESSURE	"RAW" RIGHT ROTATION PRESSURE	"RAW" LEFT ROTATION PRESSURE	PRESSURE LABEL	ADJUSTED SYSTEM PRESSURE	ADJUSTED RIGHT ROTATION PRESSURE	ADJUSTED LEFT ROTATION PRESSURE

See table 10.2b for interpretation of this data, and table 7c for active key commands during this session.

TABLE 10.2b C4000 INTERPRETATION OF 'COLLECT DATA' MODE:

Column	Meanings of output line columns:
1	Blower command level (0..255) Numbers are directly proportional to pressure.
2	Right Fill Solenoid State (J13.1,2) .=closed o=open
3	Right Vent Solenoid State (J13.3,4) .=closed o=open
4	Left Fill Solenoid State (J13.5,6) .=closed o=open
5	Left Vent Solenoid State (J13.7,8) .=closed o=open
6	Raw Blower Pressure Sensor (U25) (0..255)
7	Raw Right Bladder Sensor (U26) (0..255)
8	Raw Left Bladder Sensor (U27) (0..255)
9	Blower Pressure in mmHg (filtered and adjusted with sensor calibration)
10	Right Bladder Pressure in mmHg (filtered and adjusted with sensor calibration)
11	Left Bladder Pressure in mmHg (filtered and adjusted with sensor calibration)

Commands can be given to the system in Collect Data mode, these commands can be used to verify system function. Refer to table 10.2c for definition of available commands.

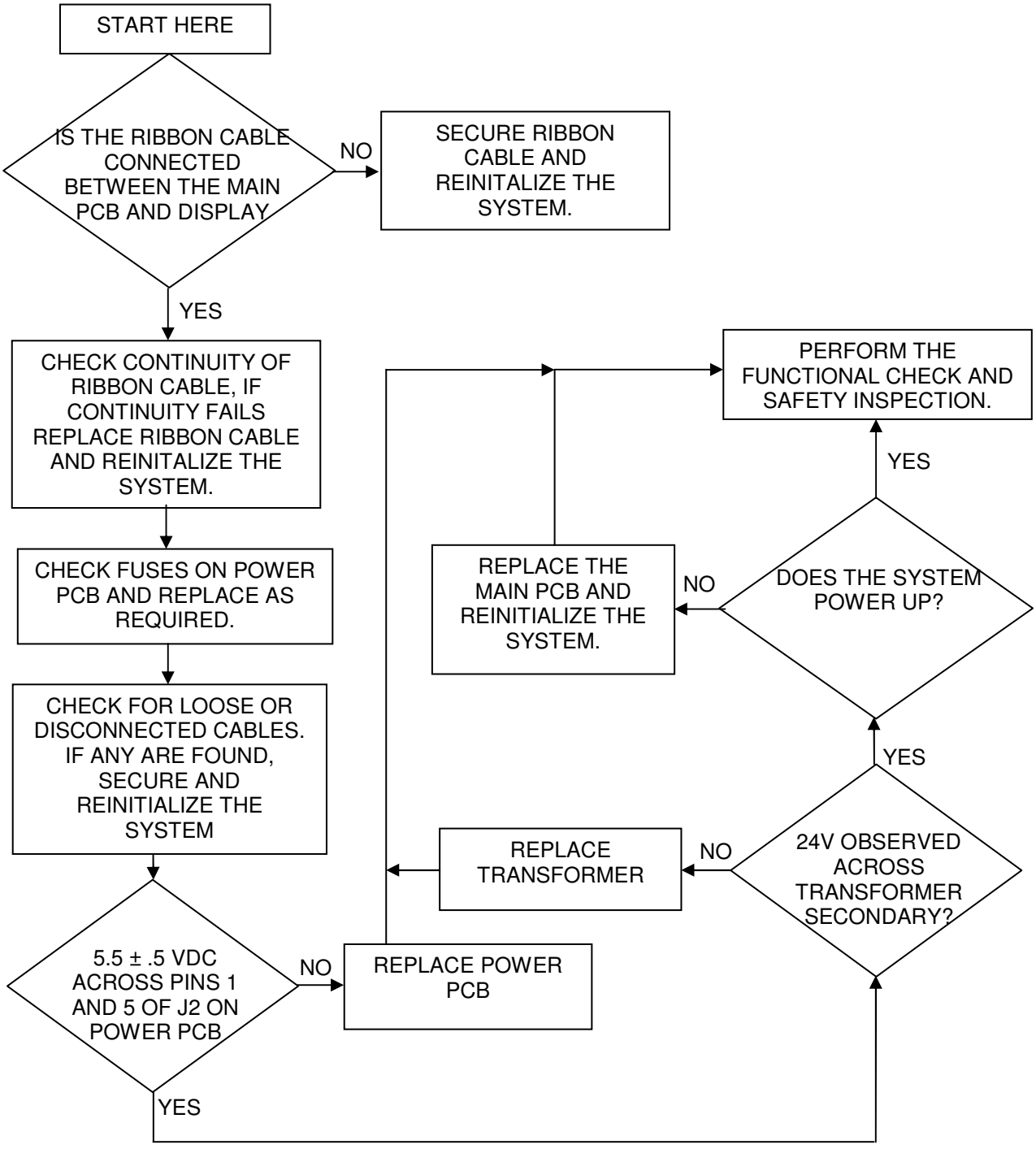
TABLE 10.2c C4000 KEY COMMANDS ACTIVE DURING COLLECT DATA SESSION:

Key	Action
0	Blower speed = 0 DAC units, control voltage = 0
1	Blower speed = 50 DAC units, control voltage = 1.96v
2	Blower speed = 60 DAC units, control voltage = 2.35v
3	Blower speed = 80 DAC units, control voltage = 3.14v
4	Blower speed = 100 DAC units, control voltage = 3.92v
5	Blower speed = 120 DAC units, control voltage = 4.71v
6	Blower speed = 140 DAC units, control voltage = 5.49v
7	Blower speed = 160 DAC units, control voltage = 6.27v
8	Blower speed = 180 DAC units, control voltage = 7.06v
9	Blower speed = 250 DAC units, control voltage = 9.80v
,	Decrement blower speed by 1 DAC unit, control voltage by 39mV
<	Decrement blower speed by 1 DAC unit, control voltage by 39mV
.	Increment blower speed by 1 DAC unit, control voltage by 39mV
>	Increment blower speed by 1 DAC unit, control voltage by 39mV
a	Command APP motor to seek upper position

s	Command APP motor to seek center position
d	Command APP motor to seek lower position
A	Command APP motor to run CCW continuously (don't monitor APP sensors)
S	Command APP motor to stop (don't monitor APP sensors)
D	Command APP motor to run CW continuously (don't monitor APP sensors)
L	Open left fill valve (and close left vent valve if Auto-Close mode set)
[CTRL] + L	Open left vent valve
l	Close left fill and vent valves
R	Open right fill valve (and close right vent valve if Auto-Close mode set)
[CTRL] + R	Open right vent valve
r	Close right fill and vent valves
B	Open both fill valves (and close vent valves if Auto-Close mode set)
[CTRL] + b	Open both vent valves
b	Close all valves
n	Disable vent auto-close mode, prevents simultaneous fill and vent
x	Set vent auto-close mode, allows simultaneous fill and vent
P	enable periodic bladder sampling
p	cancel periodic bladder sampling
ESC	exit Collect Data
Enter	exit Collect Data

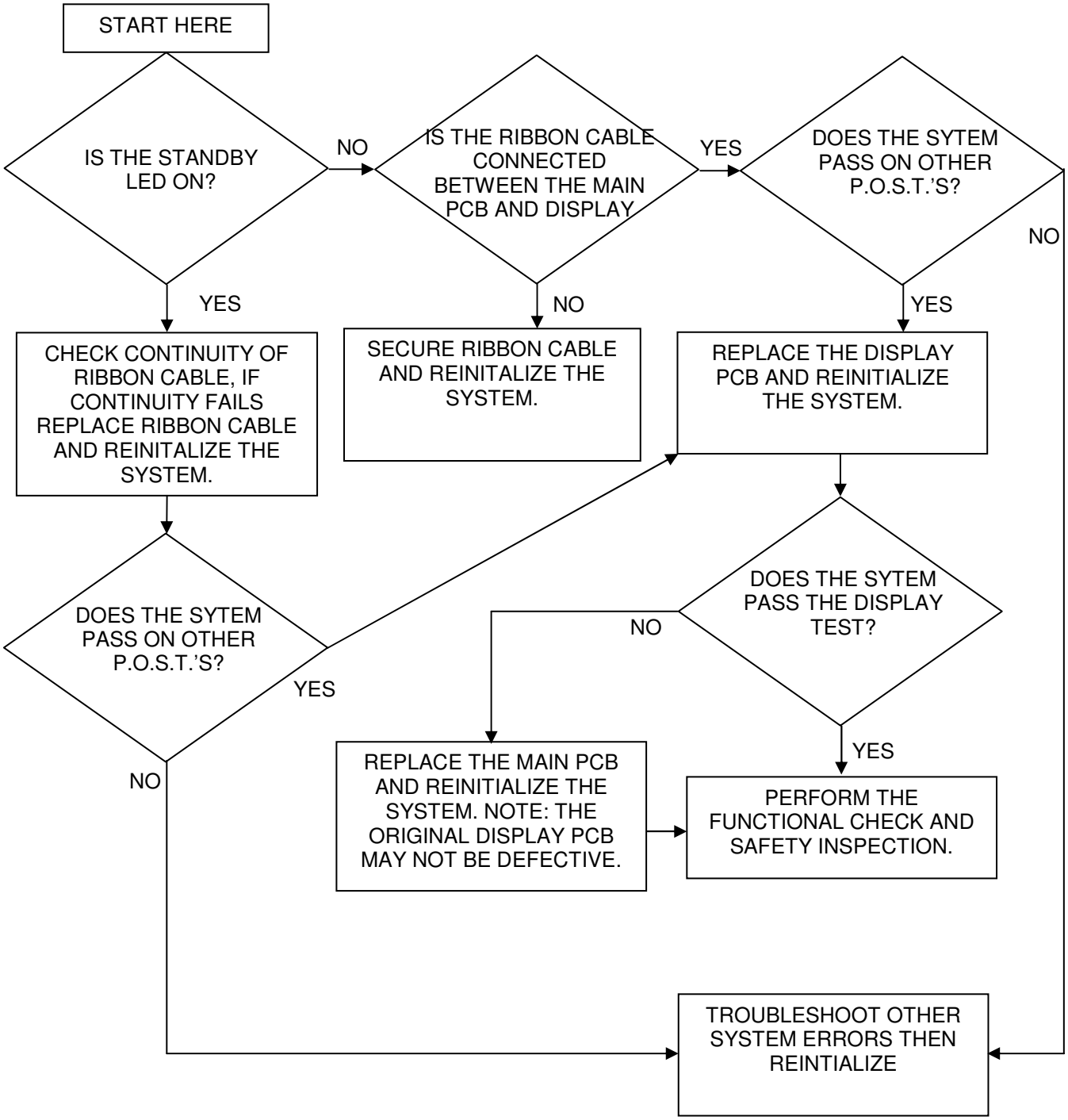
Troubleshooting Chart 10.0 No Power-Up, No Processor Activity

HINT: The standby light should be on any time power is available to the control unit. The standby light can be used to verify fuse integrity, and connection of the ribbon cable between the Main PCB and Display Board.

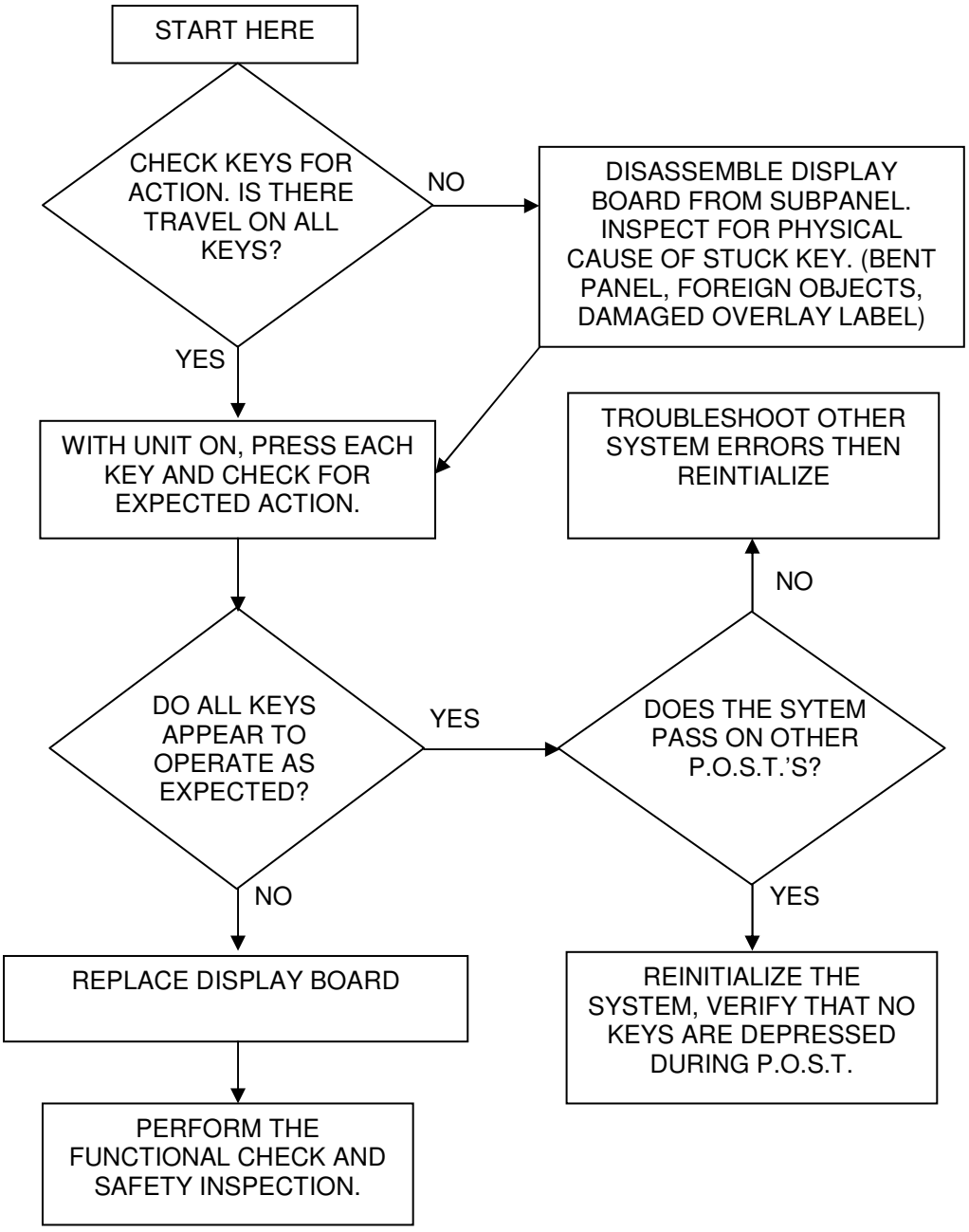

START HERE
IS THE RIBBON CABLE CONNECTED BETWEEN THE MAIN PCB AND DISPLAY
NO
SECURE RIBBON CABLE AND REINITALIZE THE SYSTEM.
YES
CHECK CONTINUITY OF RIBBON CABLE, IF CONTINUITY FAILS REPLACE RIBBON CABLE AND REINITALIZE THE SYSTEM.
CHECK FUSES ON POWER PCB AND REPLACE AS REQUIRED.
CHECK FOR LOOSE OR DISCONNECTED CABLES. IF ANY ARE FOUND, SECURE AND REINITIALIZE THE SYSTEM
5.5 ± .5 VDC ACROSS PINS 1 AND 5 OF J2 ON POWER PCB
NO
REPLACE POWER PCB
YES
REPLACE TRANSFORMER
NO
24V OBSERVED ACROSS TRANSFORMER SECONDARY?
YES
REPLACE THE MAIN PCB AND REINITIALIZE THE SYSTEM.
NO
DOES THE SYSTEM POWER UP?
YES
PERFORM THE FUNCTIONAL CHECK AND SAFETY INSPECTION.

Troubleshooting Chart 10.1 (DISPLAY TEST)

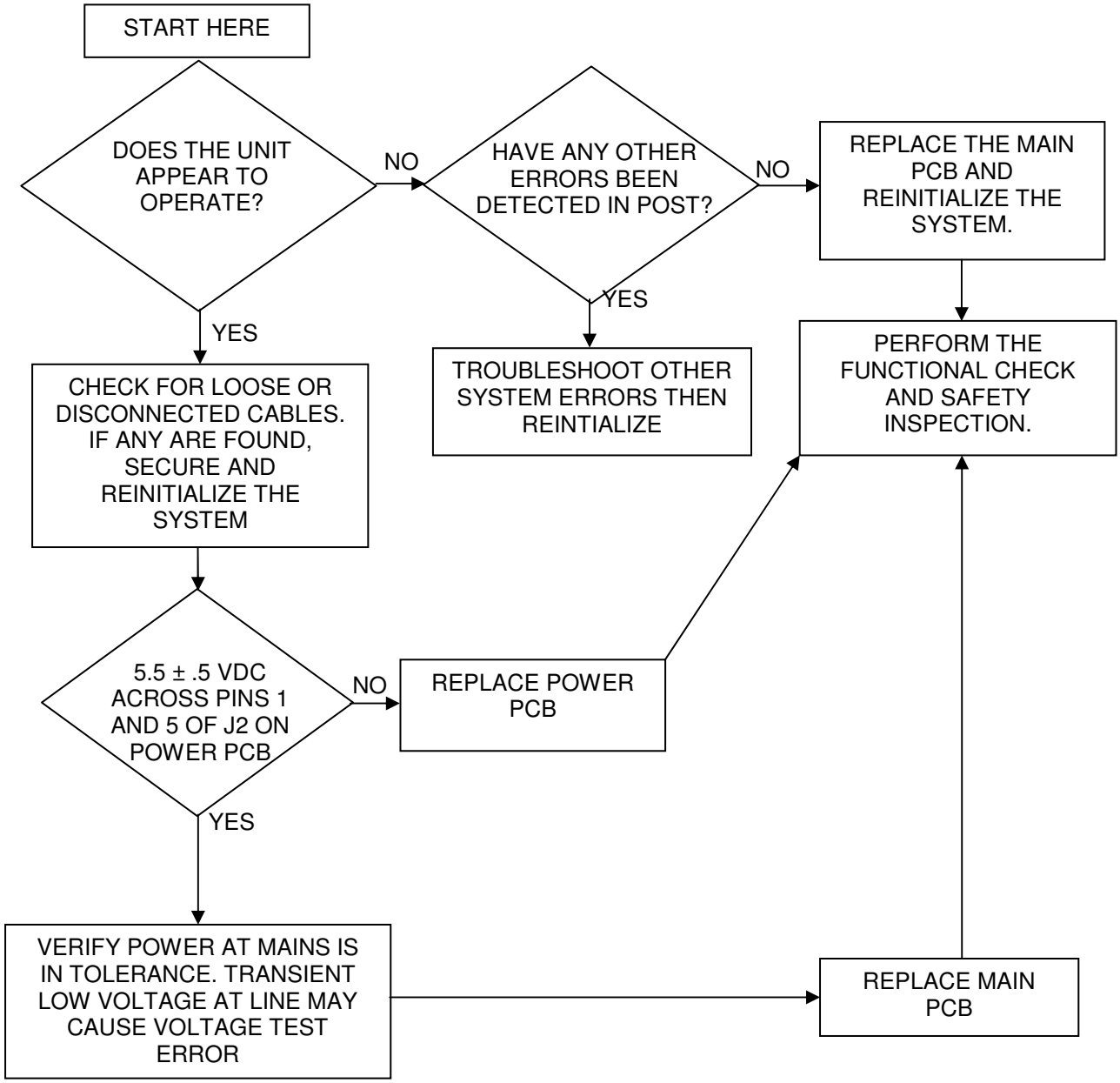
HINT: For general troubleshooting always check for loose wires, and connectors that may not be attached.


START HERE
IS THE STANDBY LED ON?
NO
IS THE RIBBON CABLE CONNECTED BETWEEN THE MAIN PCB AND DISPLAY
YES
DOES THE SYTEM PASS ON OTHER P.O.S.T.'S?
NO
YES
NO
YES
CHECK CONTINUITY OF RIBBON CABLE, IF CONTINUITY FAILS REPLACE RIBBON CABLE AND REINITALIZE THE SYSTEM.
SECURE RIBBON CABLE AND REINITALIZE THE SYSTEM.
REPLACE THE DISPLAY PCB AND REINITIALIZE THE SYSTEM.
DOES THE SYTEM PASS ON OTHER P.O.S.T.'S?
YES
NO
DOES THE SYTEM PASS THE DISPLAY TEST?
NO
YES
REPLACE THE MAIN PCB AND REINITIALIZE THE SYSTEM. NOTE: THE ORIGINAL DISPLAY PCB MAY NOT BE DEFECTIVE.
PERFORM THE FUNCTIONAL CHECK AND SAFETY INSPECTION.
TROUBLESHOOT OTHER SYSTEM ERRORS THEN REINTIALIZE

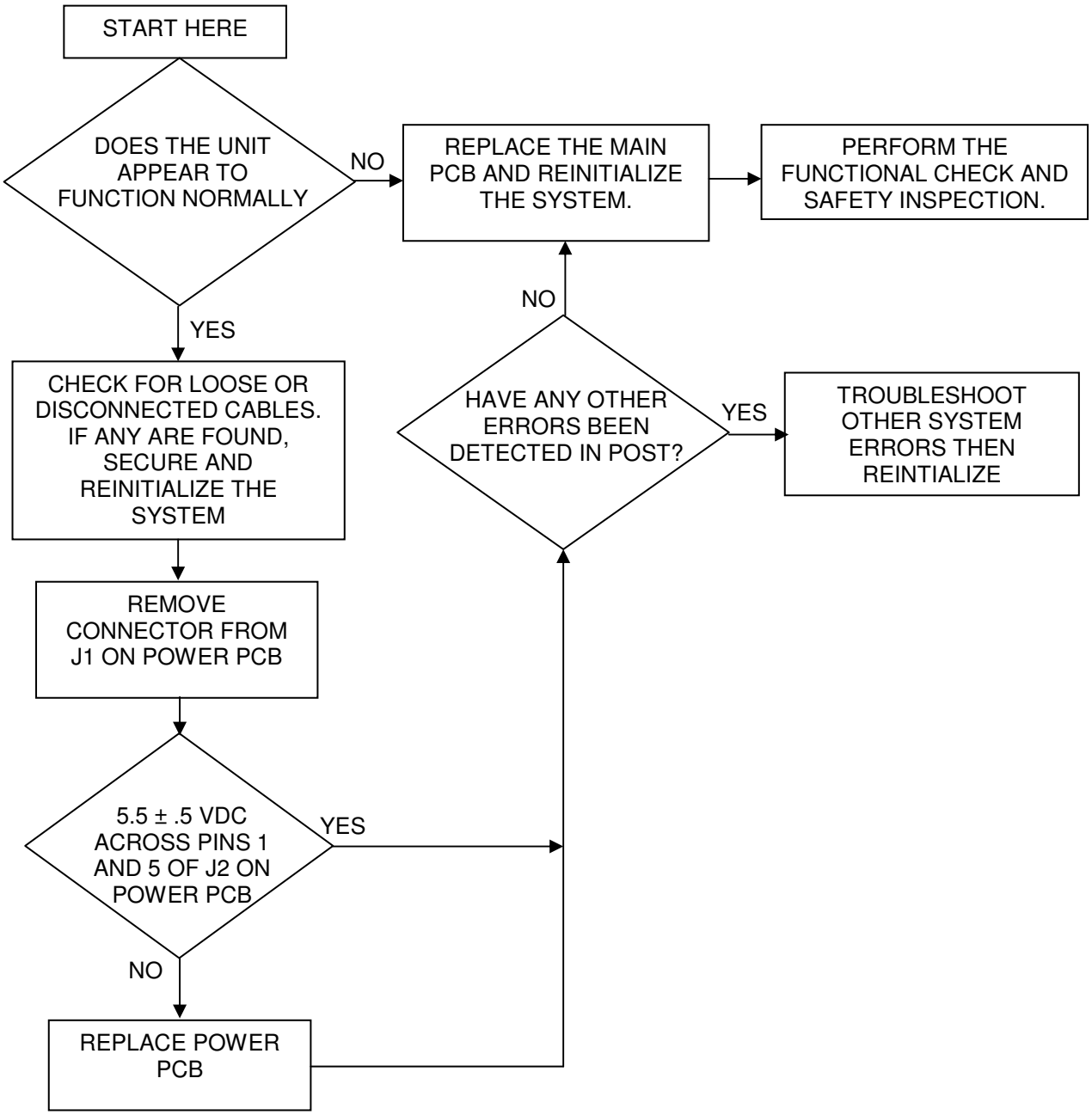
Troubleshooting Chart 10.2 (STUCK KEY TEST)


START HERE
CHECK KEYS FOR ACTION. IS THERE TRAVEL ON ALL KEYS?
NO
DISASSEMBLE DISPLAY BOARD FROM SUBPANEL. INSPECT FOR PHYSICAL CAUSE OF STUCK KEY. (BENT PANEL, FOREIGN OBJECTS, DAMAGED OVERLAY LABEL)
YES
WITH UNIT ON, PRESS EACH KEY AND CHECK FOR EXPECTED ACTION.
TROUBLESHOOT OTHER SYSTEM ERRORS THEN REINTIALIZE
NO
DO ALL KEYS APPEAR TO OPERATE AS EXPECTED?
YES
DOES THE SYTEM PASS ON OTHER P.O.S.T.'S?
NO
YES
REPLACE DISPLAY BOARD
REINITIALIZE THE SYSTEM, VERIFY THAT NO KEYS ARE DEPRESSED DURING P.O.S.T.
PERFORM THE FUNCTIONAL CHECK AND SAFETY INSPECTION.

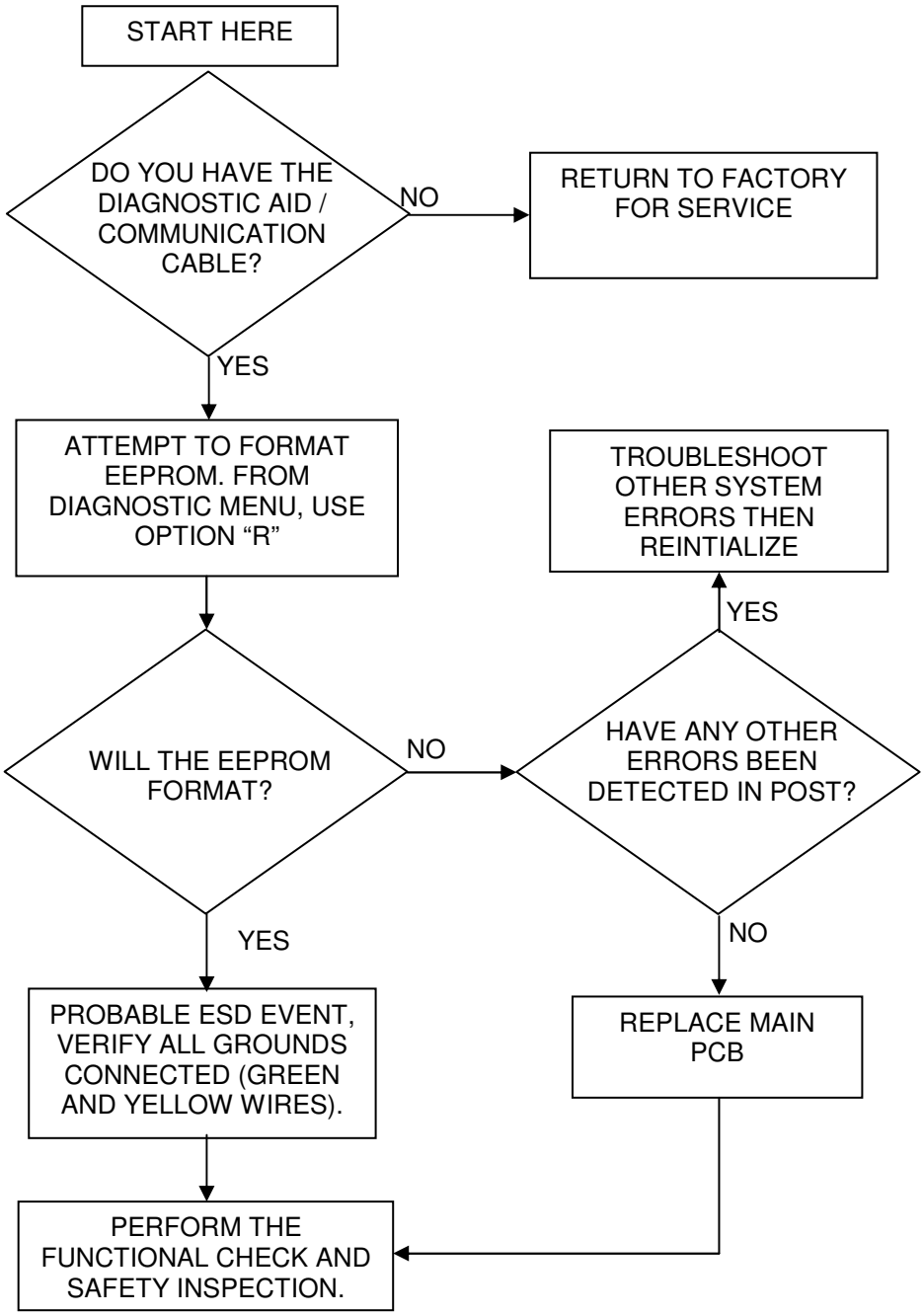
Troubleshooting Chart 10.3 (VOLTAGE TESTS)


START HERE
DOES THE UNIT APPEAR TO OPERATE?
NO
HAVE ANY OTHER ERRORS BEEN DETECTED IN POST?
NO
REPLACE THE MAIN PCB AND REINITIALIZE THE SYSTEM.
YES
YES
TROUBLESHOOT OTHER SYSTEM ERRORS THEN REINTIALIZE
PERFORM THE FUNCTIONAL CHECK AND SAFETY INSPECTION.
CHECK FOR LOOSE OR DISCONNECTED CABLES. IF ANY ARE FOUND, SECURE AND REINITIALIZE THE SYSTEM
5.5 ± .5 VDC ACROSS PINS 1 AND 5 OF J2 ON POWER PCB
NO
REPLACE POWER PCB
YES
VERIFY POWER AT MAINS IS IN TOLERANCE. TRANSIENT LOW VOLTAGE AT LINE MAY CAUSE VOLTAGE TEST ERROR
REPLACE MAIN PCB

Troubleshooting Chart 10.4 (ADC/DAC TEST)

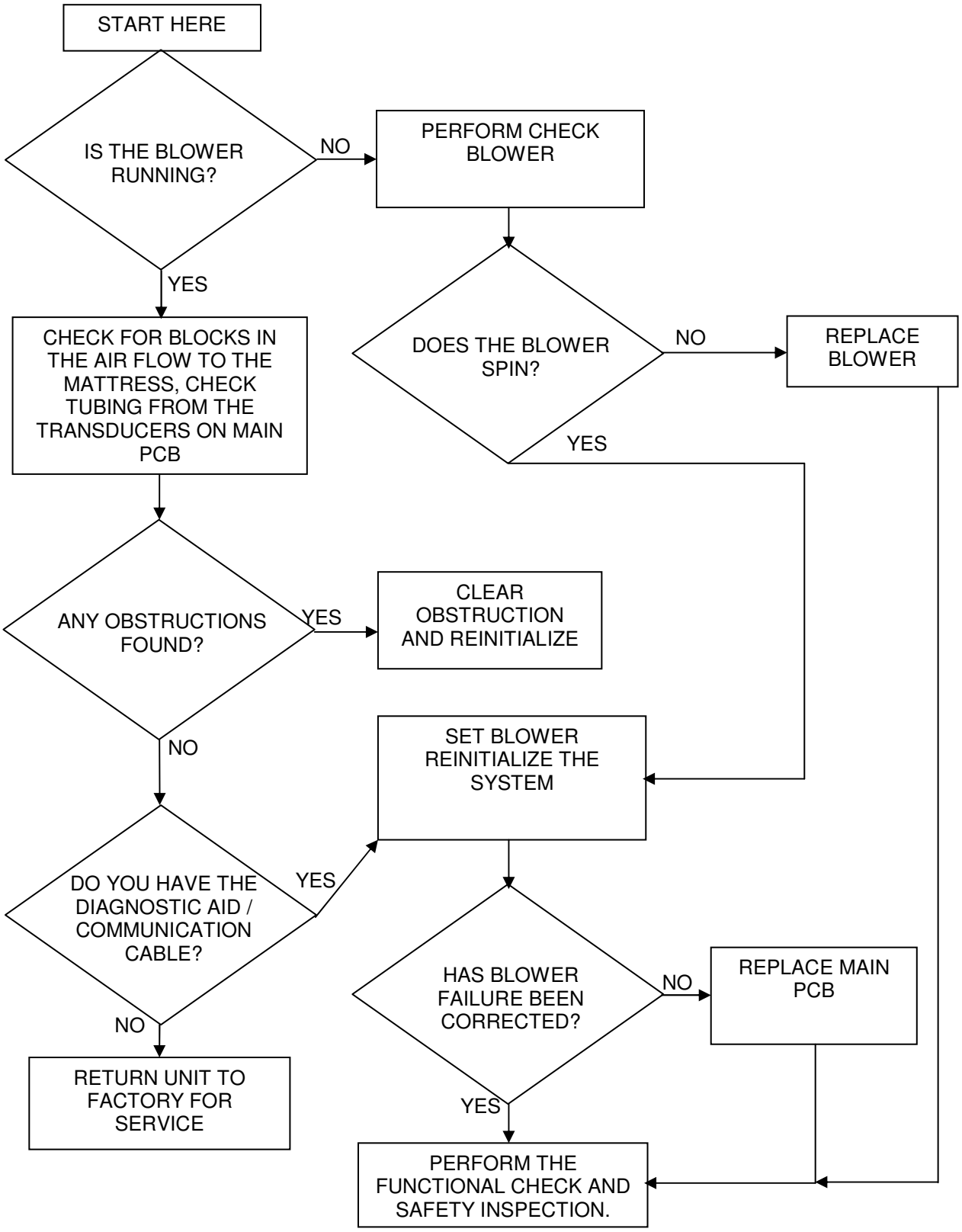

START HERE
DOES THE UNIT APPEAR TO FUNCTION NORMALLY
NO
REPLACE THE MAIN PCB AND REINITIALIZE THE SYSTEM.
PERFORM THE FUNCTIONAL CHECK AND SAFETY INSPECTION.
YES
CHECK FOR LOOSE OR DISCONNECTED CABLES. IF ANY ARE FOUND, SECURE AND REINITIALIZE THE SYSTEM
REMOVE CONNECTOR FROM J1 ON POWER PCB
5.5 ± .5 VDC ACROSS PINS 1 AND 5 OF J2 ON POWER PCB
YES
NO
REPLACE POWER PCB
NO
HAVE ANY OTHER ERRORS BEEN DETECTED IN POST?
YES
TROUBLESHOOT OTHER SYSTEM ERRORS THEN REINTIALIZE

Troubleshooting Chart 10.5 *(EEPROM TEST)*

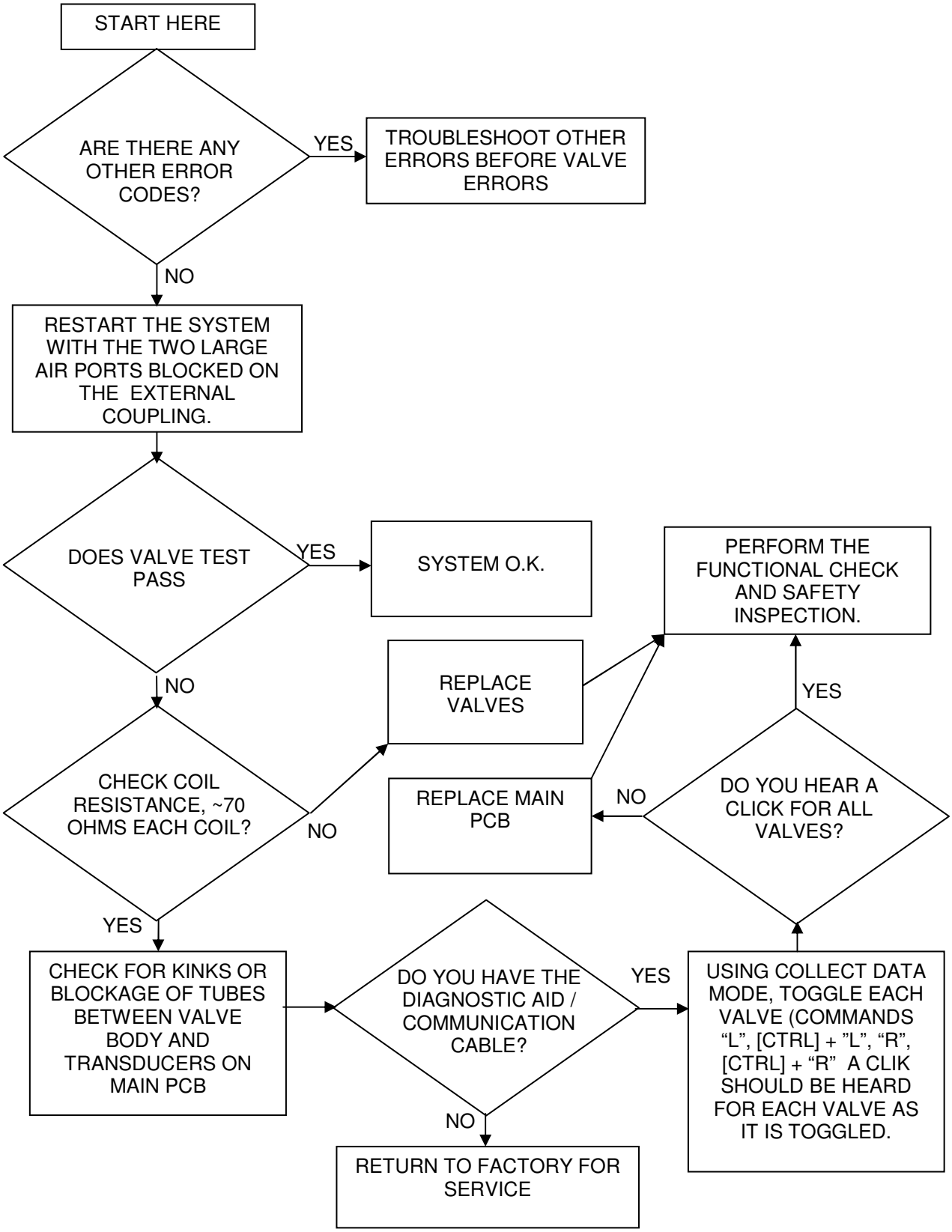

START HERE
DO YOU HAVE THE DIAGNOSTIC AID / COMMUNICATION CABLE?
NO
RETURN TO FACTORY FOR SERVICE
YES
ATTEMPT TO FORMAT EEPROM. FROM DIAGNOSTIC MENU, USE OPTION "R"
WILL THE EEPROM FORMAT?
NO
HAVE ANY OTHER ERRORS BEEN DETECTED IN POST?
YES
TROUBLESHOOT OTHER SYSTEM ERRORS THEN REINTIALIZE
YES
PROBABLE ESD EVENT, VERIFY ALL GROUNDS CONNECTED (GREEN AND YELLOW WIRES).
NO
REPLACE MAIN PCB
PERFORM THE FUNCTIONAL CHECK AND SAFETY INSPECTION.

Troubleshooting Chart 10.6 *(BLOWER TEST)*

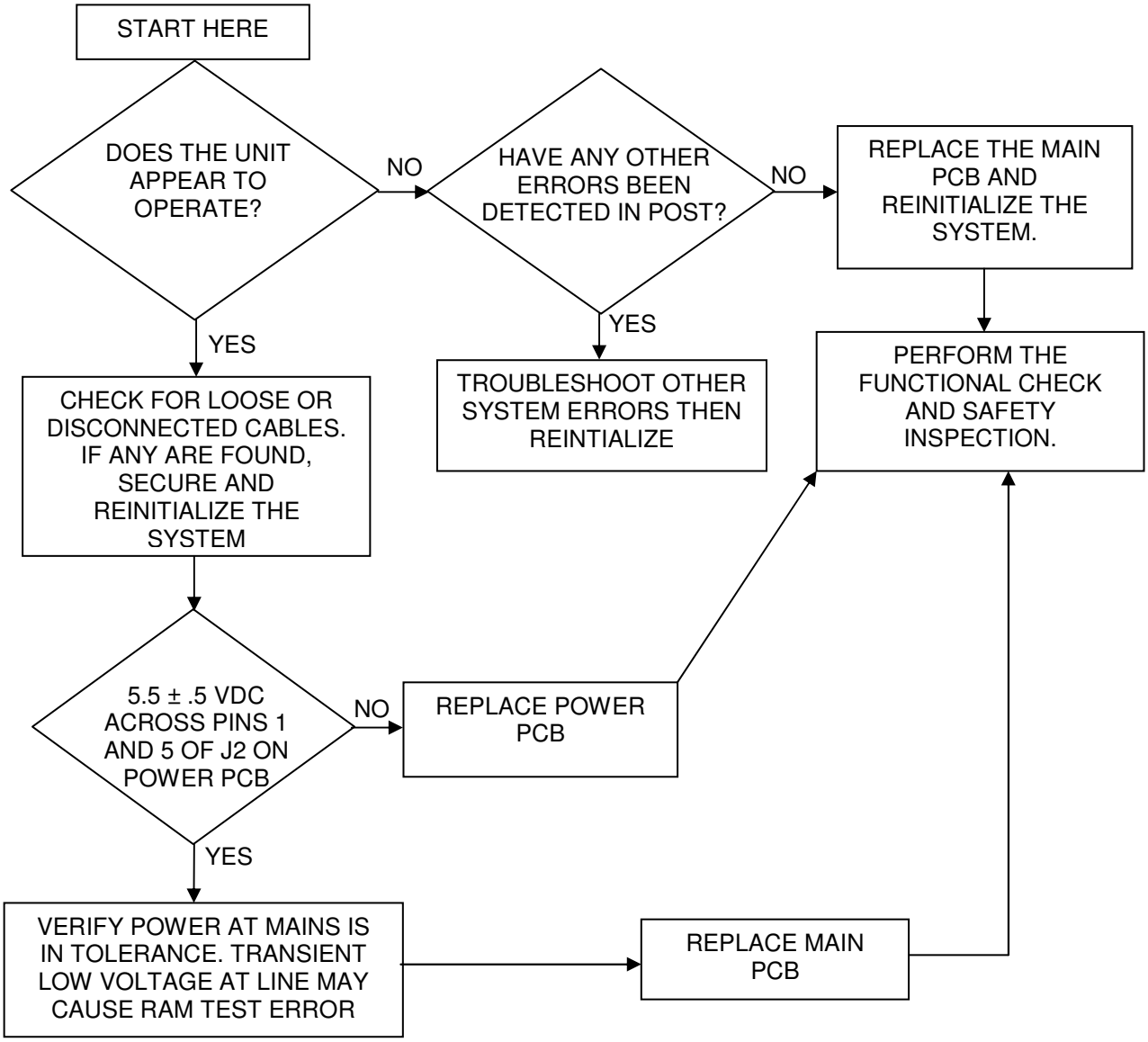
NOTE: If any other errors are detected diagnose and repair them first.



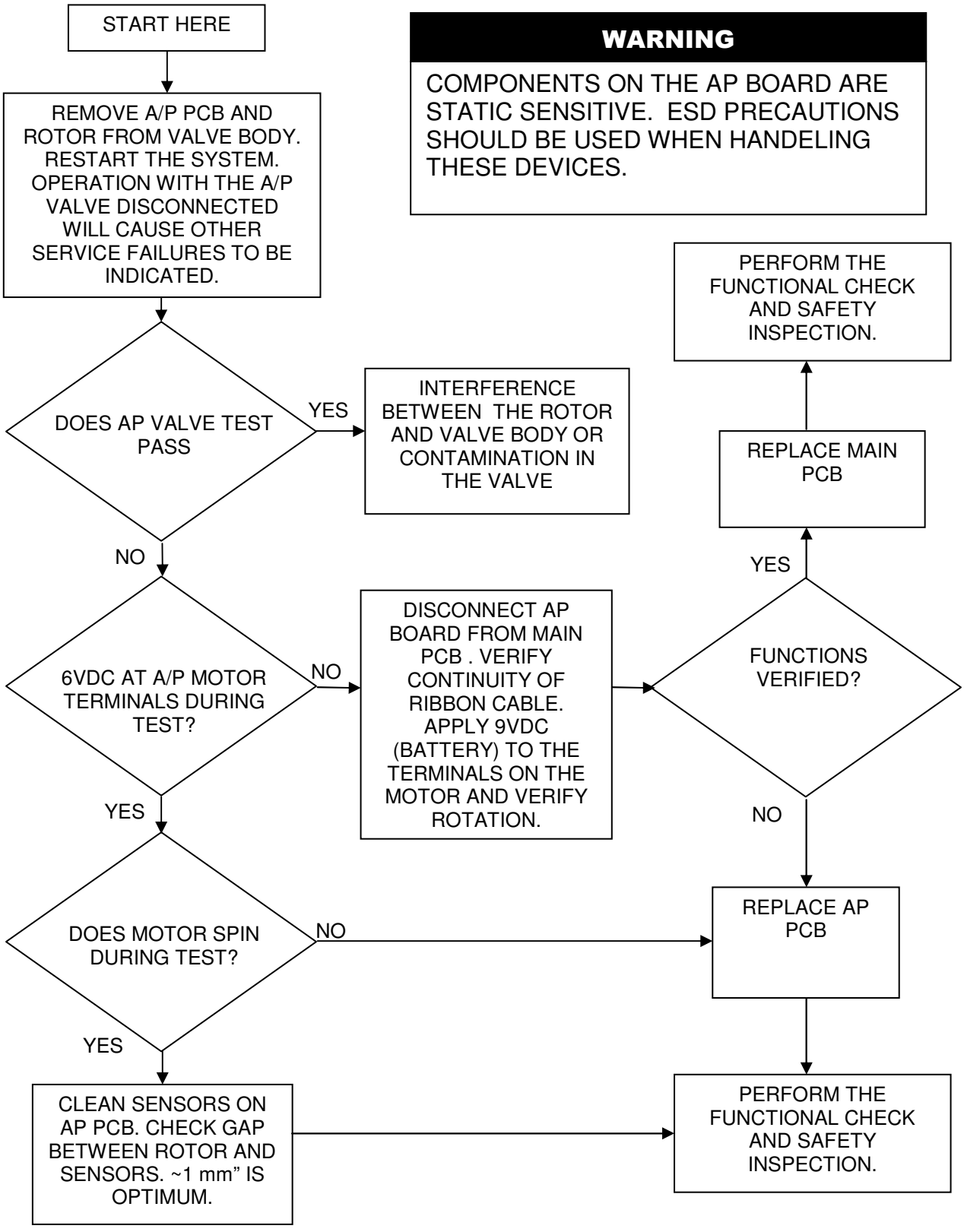
Troubleshooting Chart 10.7 *(VALVE TEST)*


START HERE
ARE THERE ANY OTHER ERROR CODES?
YES
TROUBLESHOOT OTHER ERRORS BEFORE VALVE ERRORS
NO
RESTART THE SYSTEM WITH THE TWO LARGE AIR PORTS BLOCKED ON THE EXTERNAL COUPLING.
DOES VALVE TEST PASS
YES
SYSTEM O.K.
NO
CHECK COIL RESISTANCE, ~70 OHMS EACH COIL?
NO
REPLACE VALVES
YES
CHECK FOR KINKS OR BLOCKAGE OF TUBES BETWEEN VALVE BODY AND TRANSDUCERS ON MAIN PCB
DO YOU HAVE THE DIAGNOSTIC AID / COMMUNICATION CABLE?
YES
NO
RETURN TO FACTORY FOR SERVICE
USING COLLECT DATA MODE, TOGGLE EACH VALVE (COMMANDS "L", [CTRL] + "L", "R", [CTRL] + "R" A CLIK SHOULD BE HEARD FOR EACH VALVE AS IT IS TOGGLED.
DO YOU HEAR A CLICK FOR ALL VALVES?
NO
REPLACE MAIN PCB
YES
PERFORM THE FUNCTIONAL CHECK AND SAFETY INSPECTION.

Troubleshooting Chart 10.8 *(RAM TEST)*


START HERE
DOES THE UNIT APPEAR TO OPERATE?
NO
HAVE ANY OTHER ERRORS BEEN DETECTED IN POST?
NO
REPLACE THE MAIN PCB AND REINITIALIZE THE SYSTEM.
YES
YES
TROUBLESHOOT OTHER SYSTEM ERRORS THEN REINTIALIZE
PERFORM THE FUNCTIONAL CHECK AND SAFETY INSPECTION.
CHECK FOR LOOSE OR DISCONNECTED CABLES. IF ANY ARE FOUND, SECURE AND REINITIALIZE THE SYSTEM
5.5 ± .5 VDC ACROSS PINS 1 AND 5 OF J2 ON POWER PCB
NO
REPLACE POWER PCB
YES
VERIFY POWER AT MAINS IS IN TOLERANCE. TRANSIENT LOW VOLTAGE AT LINE MAY CAUSE RAM TEST ERROR
REPLACE MAIN PCB

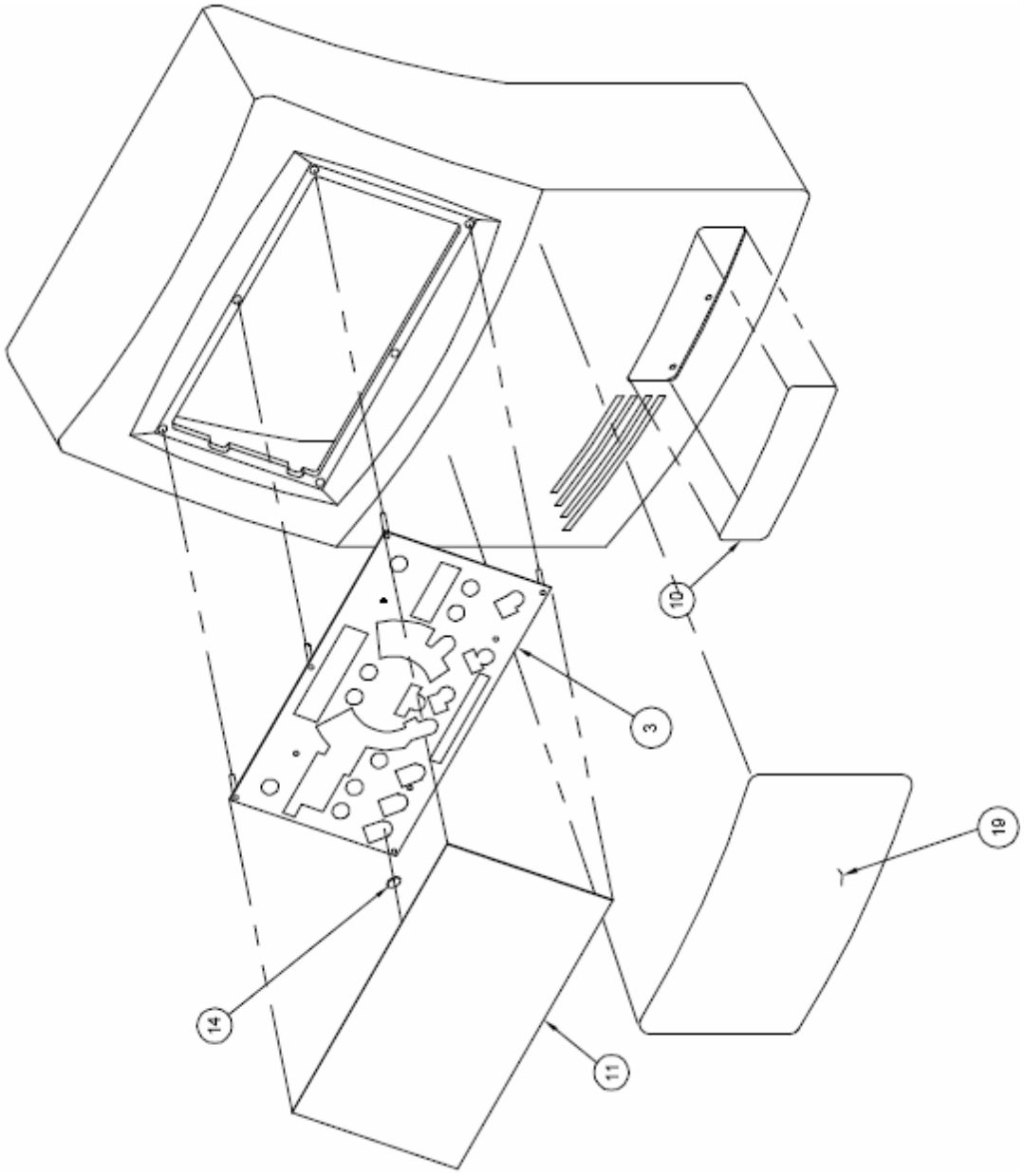
Troubleshooting Chart 10.9 ***(AP TEST)***

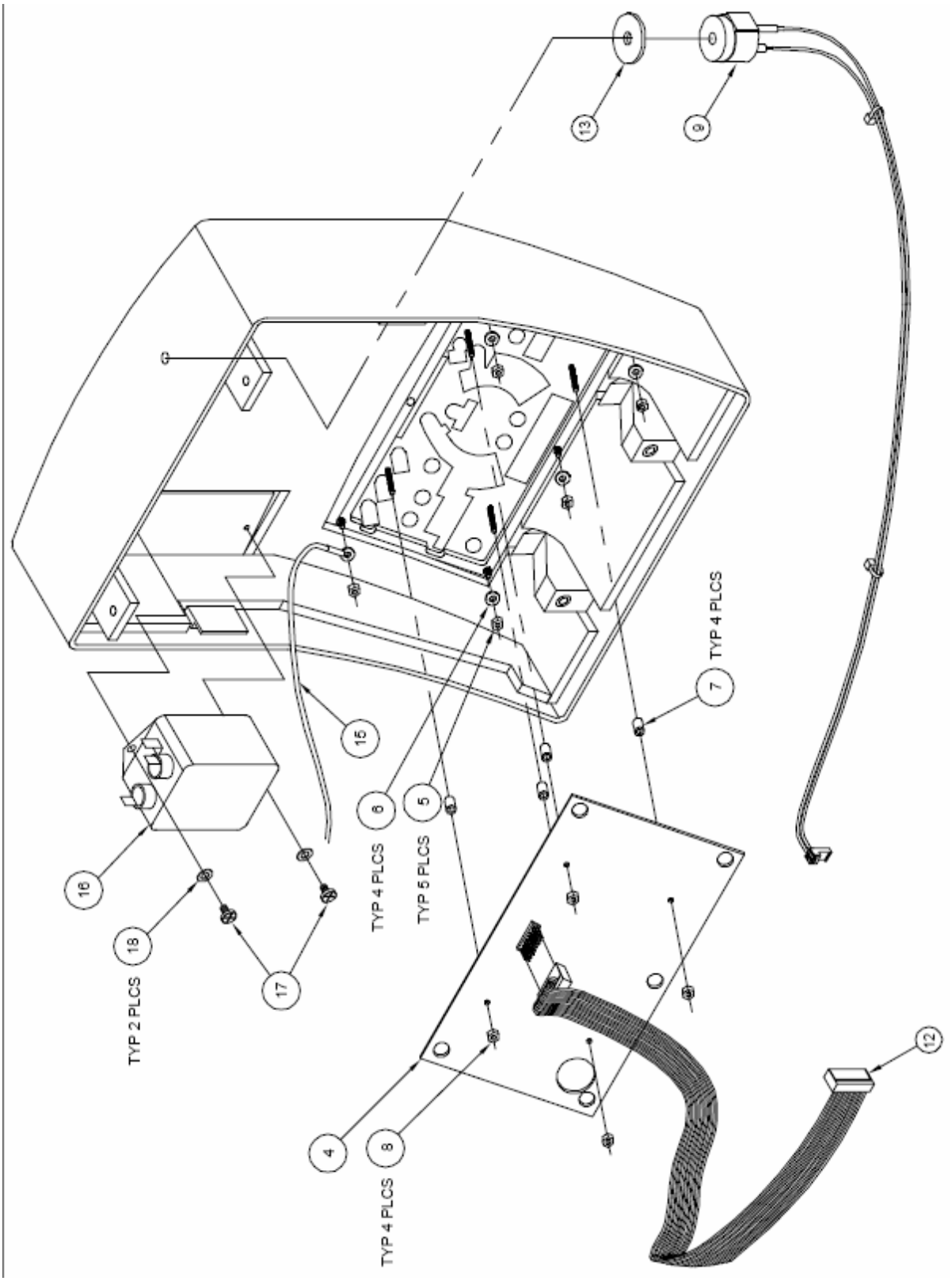

START HERE
REMOVE A/P PCB AND ROTOR FROM VALVE BODY. RESTART THE SYSTEM. OPERATION WITH THE A/P VALVE DISCONNECTED WILL CAUSE OTHER SERVICE FAILURES TO BE INDICATED.
WARNING
COMPONENTS ON THE AP BOARD ARE STATIC SENSITIVE. ESD PRECAUTIONS SHOULD BE USED WHEN HANDELING THESE DEVICES.
DOES AP VALVE TEST PASS
YES
INTERFERENCE BETWEEN THE ROTOR AND VALVE BODY OR CONTAMINATION IN THE VALVE
NO
6VDC AT A/P MOTOR TERMINALS DURING TEST?
NO
DISCONNECT AP BOARD FROM MAIN PCB . VERIFY CONTINUITY OF RIBBON CABLE. APPLY 9VDC (BATTERY) TO THE TERMINALS ON THE MOTOR AND VERIFY ROTATION.
FUNCTIONS VERIFIED?
YES
REPLACE MAIN PCB
PERFORM THE FUNCTIONAL CHECK AND SAFETY INSPECTION.
NO
REPLACE AP PCB
YES
DOES MOTOR SPIN DURING TEST?
NO
YES
CLEAN SENSORS ON AP PCB. CHECK GAP BETWEEN ROTOR AND SENSORS. ~1 mm" IS OPTIMUM.
PERFORM THE FUNCTIONAL CHECK AND SAFETY INSPECTION.

11 Assembly Drawing/Parts List

The following list of parts are available to our customers and dealers for the front assembly.

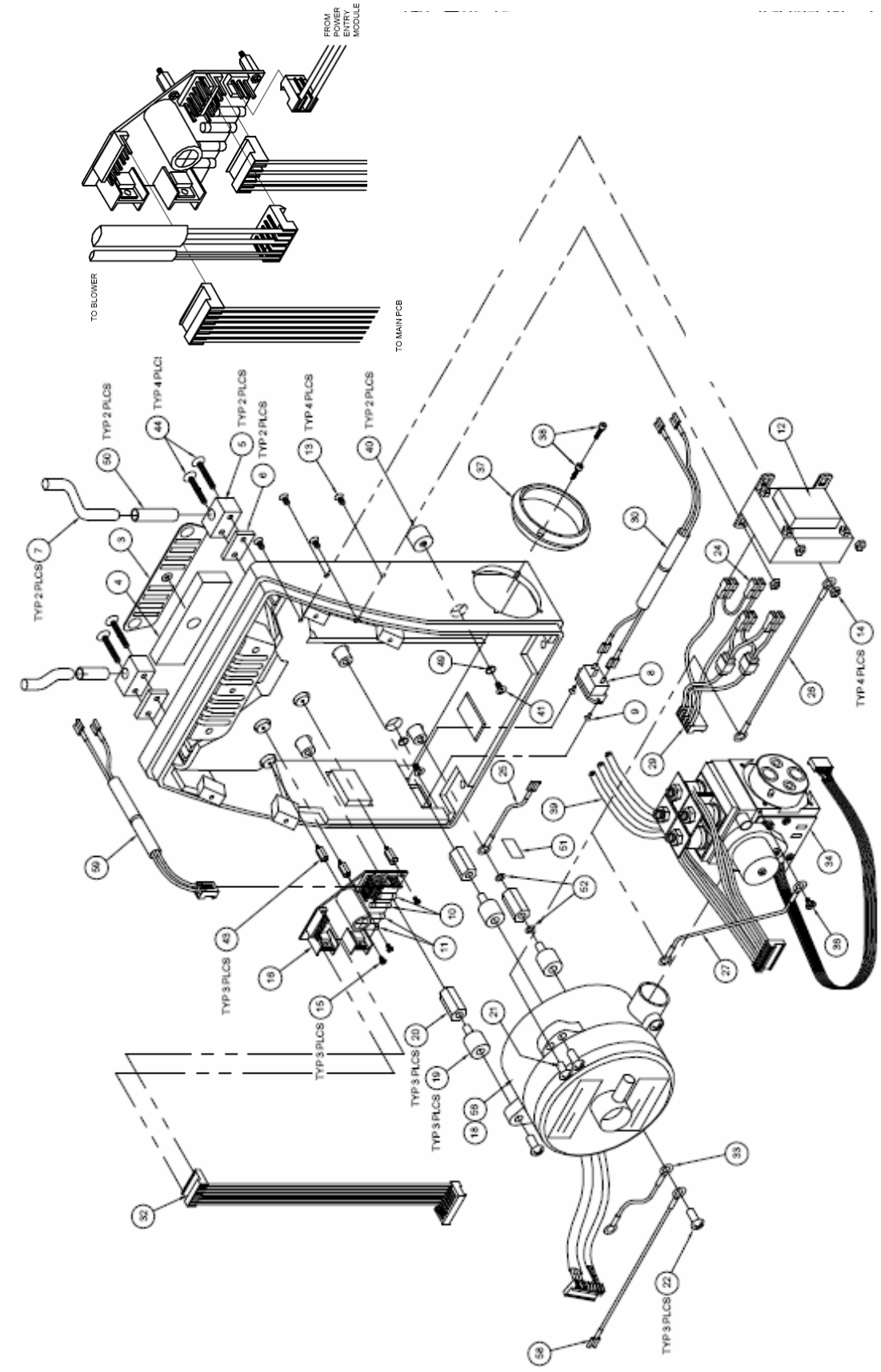
ITEM #	PART NO.	DESCRIPTION
1	20098	Front Enclosure (Order with item 2)
2	20219-F	Sound Foam Front
3	20103	Subpanel
4	11599-000	Display PCB
9	11574-000	Alarm Assembly
10	12045-001	Logo Label
11	12814-000	Overlay Label
12	10364-18	Ribbon Cable
19	100388-000	Quick Reference Label

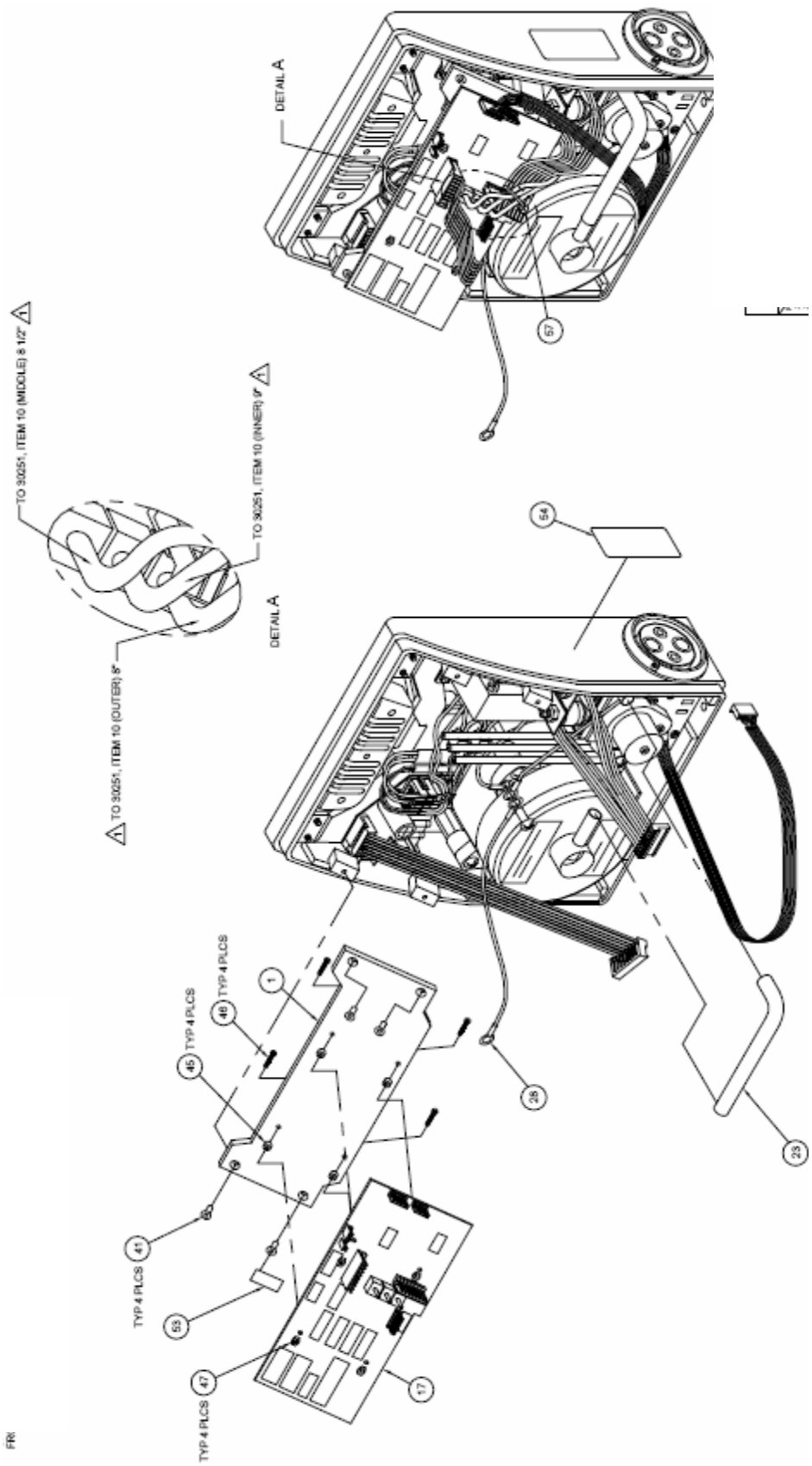

10
3
18
14
11


13
9
7
TYP 4 PLCS
15
8
TYP 4 PLCS
5
TYP 5 PLCS
16
18
TYP 2 PLCS
17
4
8
TYP 4 PLCS
12

The following list of parts are available to our customers and dealers for the rear assembly.

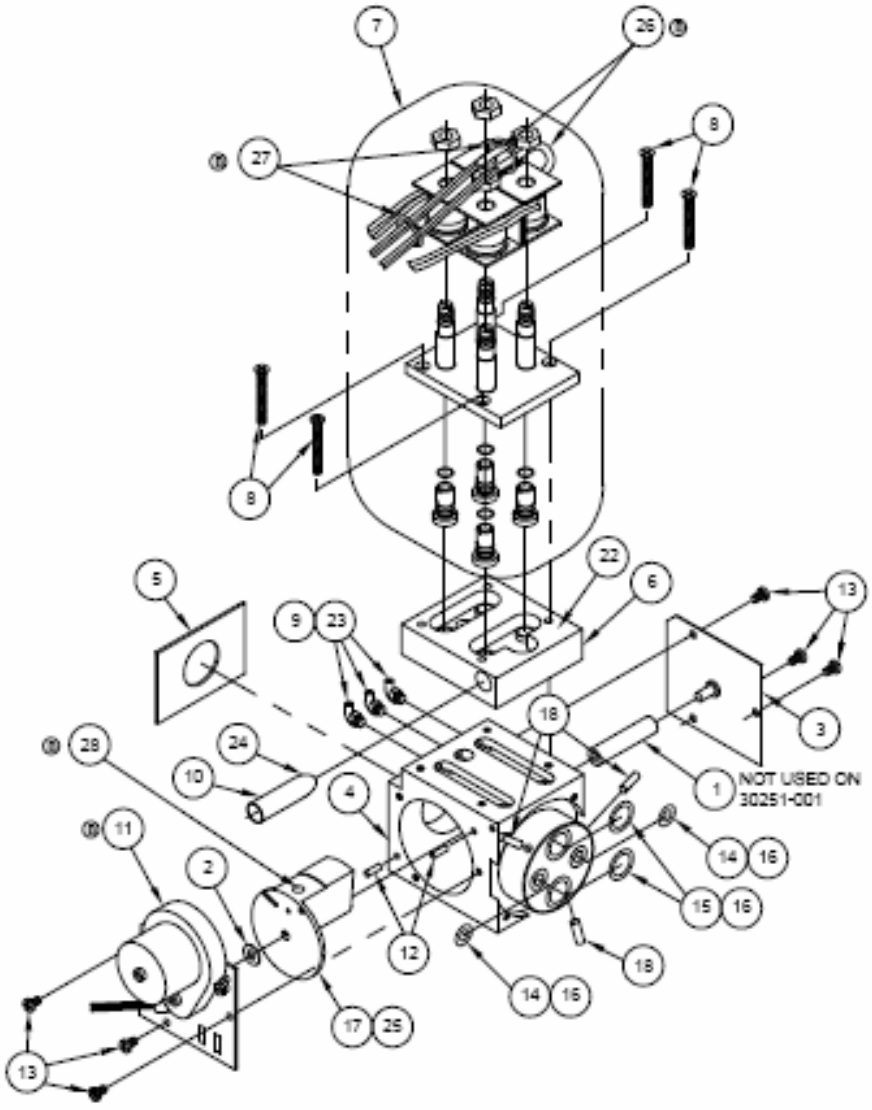
ITEM #	PART NO.	DESCRIPTION
1	20099	Rear Enclosure (Order with item 2)
2	20219-R	Rear Enclosure Sound Foam
3	20010	Filter Grill
4	20044	Filter Foam
5	20018-BA	Mounting Block
6	20017	Mounting Plate
7	20060	Hook
8	10049	Power Entry Module (P.E.M.)
10	10220	Fuse 5A
11	10271	Fuse 2A
12	10184	Transformer
16	30144	Power PCB
17	100307-000	Programmed Main PCB
18	11496-4000	Altered Blower
19	10048	Vibration Isolator
20	10047	Standoff
34	30251-001	A/P Valve Assembly
37	20091	Coupling Ring
40	10187	Rubber Bumper
43	10197-ZB	Standoff
50	10132	Sleeve
54	50041	CPR Label


FROM POWER ENTRY MODULE
TO BLOWER
TO MAIN PCB
TYP 2 PLCS
TYP 4 PLCS
TYP 2 PLCS
TYP 2 PLCS
TYP 4 PLCS
TYP 2 PLCS
TYP 2 PLCS
TYP 4 PLCS
TYP 3 PLCS
TYP 3 PLCS
TYP 3 PLCS
TYP 3 PLCS
TYP 3 PLCS


DETAIL A
57
TO 30251, ITEM 10 (MIDDLE) 8 1/2"
TO 30251, ITEM 10 (INNER) 9"
TO 30251, ITEM 10 (OUTER) 8"
DETAIL A
54
1
TYP 4 PLCS
48
TYP 4 PLCS
45
TYP 4 PLCS
41
53
TYP 4 PLCS
47
17
26
23
FRI

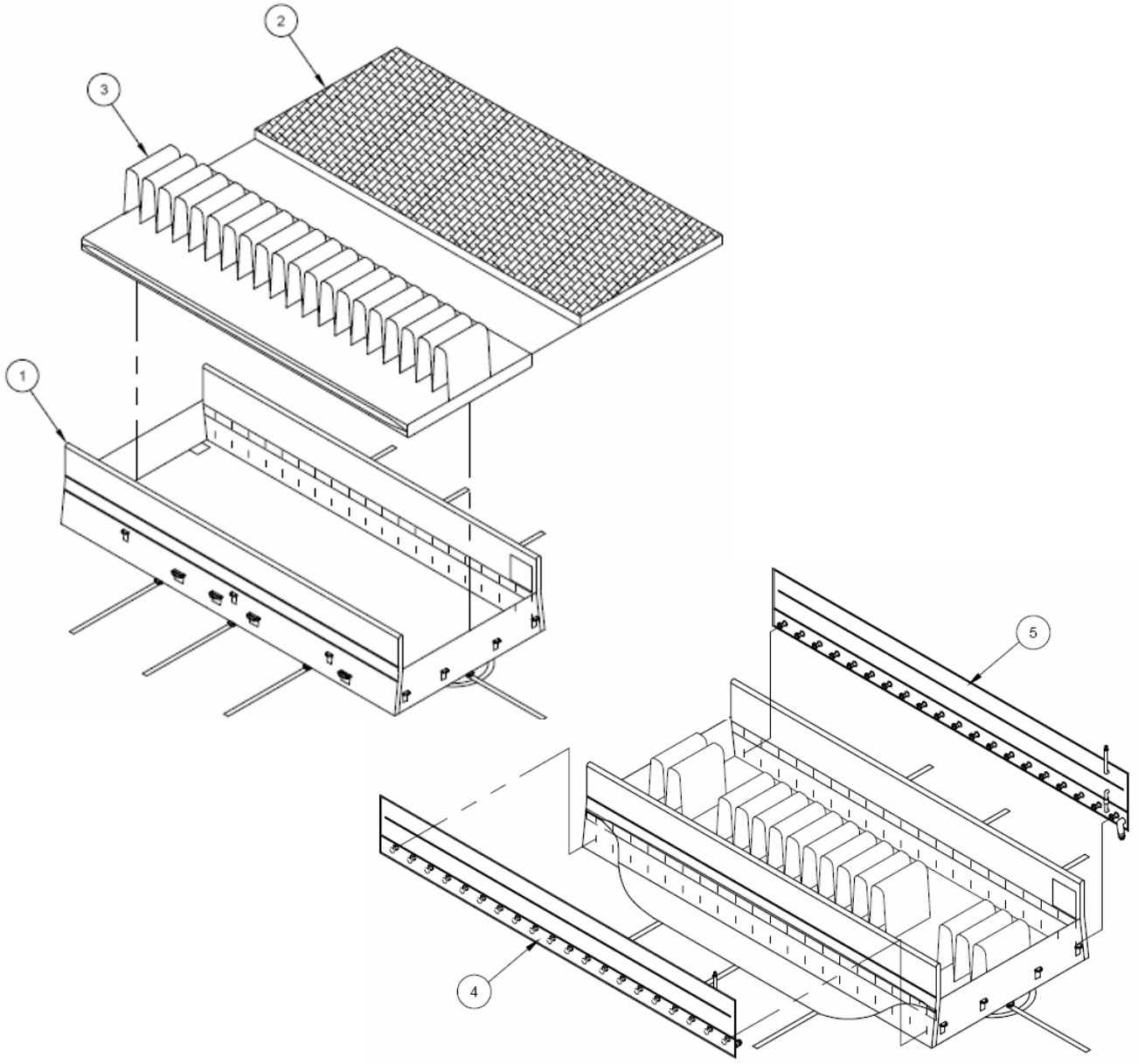
The following list of parts is available to our customers and dealers for the Valve assembly.

ITEM #	PART NO.	DESCRIPTION
5	20048	A/P Valve Gasket
7	30213	Valve Assembly
11	12878-000	A/P PCB
14	10189	O-Ring 3/8 I.D.
15	10191	O-Ring 5/8 I.D.
25	11783-000	Rotor

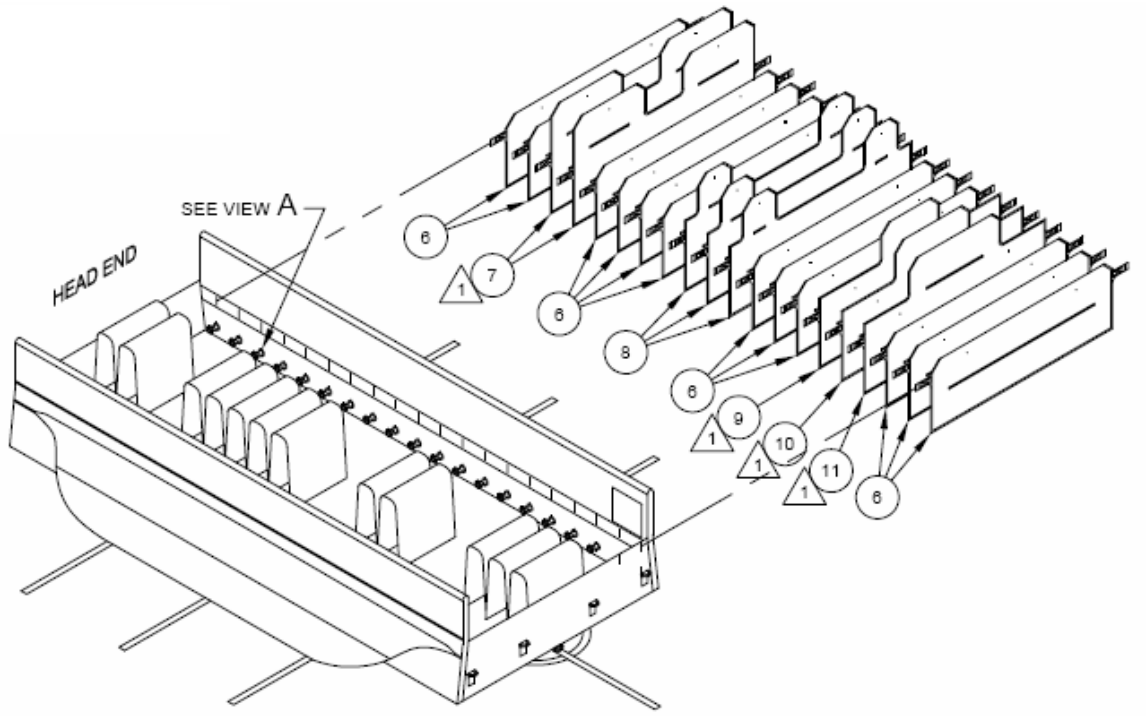


The following list of parts is available to our customers and dealers for the O_2Zoned Mattress assembly.

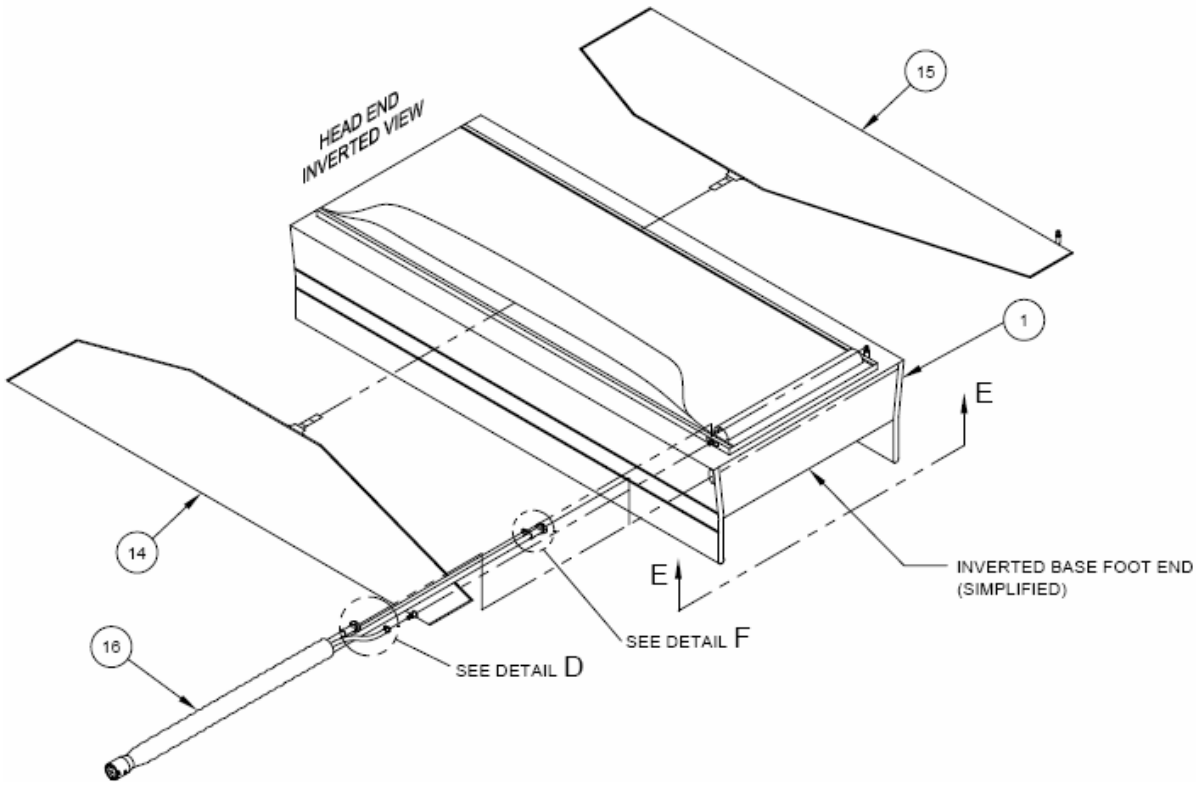
ITEM #	DESCRIPTION	PART NUMBERS BY CATALOG					
		M4000	M4000-39	M4000-48	M4001	M4001-39	M4001-48
1	Mattress Base	30190	30190-39	30190-48	30190	30190-39	30190-48
2	Foam	20001	20001	20001	20001	20001	20001
3	Foam Cover	30190-FC	30190-FC39	30190-FC48	30190-FC	30190-FC39	30190-FC48
4	Manifold Left	30321	30321	30321	30321	30321	30321
5	Manifold Right	30322	30322	30322	30322	30322	30322



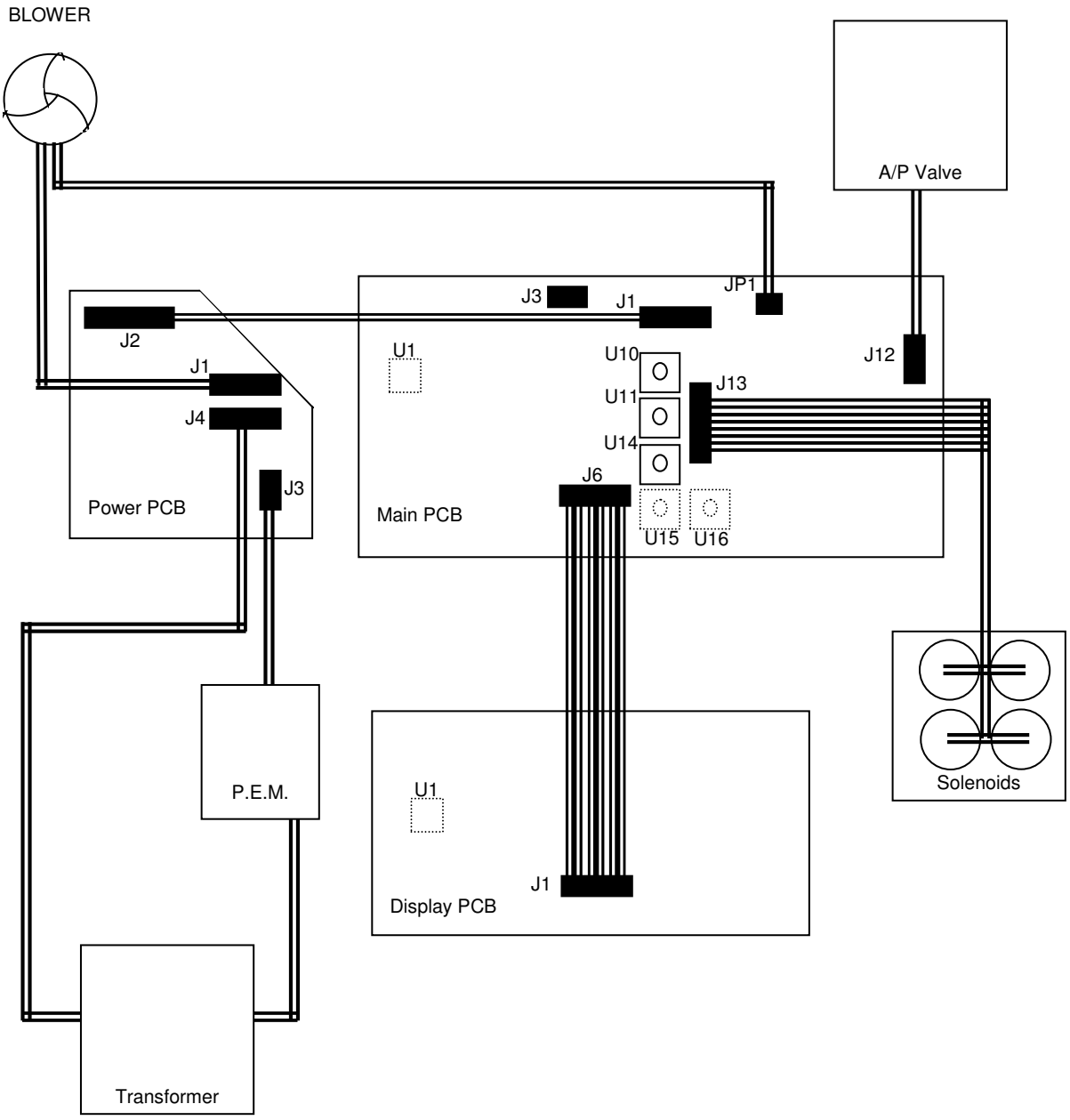
ITEM #	DESCRIPTION	PART NUMBERS BY CATALOG					
		M4000	M4000-39	M4000-48	M4001	M4001-39	M4001-48
6	Air Cell (Standard)	30130	30130-39	30130-48	30130	30130-39	30130-48
7	Air Cell (Head)	30199	30199-39	30199-48	-	-	-
8	Air Cell (Torso)	30200	30200-39	30222-48	-	-	-
9	Air Cell (10”)	30201	30201-39	30201-48	-	-	-
10	Air Cell (13”)	30209	30209-39	30201-48	-	-	-
11	Air Cell (16”)	30210	30210-39	30210-48	-	-	-



ITEM #	DESCRIPTION	PART NUMBERS BY CATALOG					
		M4000	M4000-39	M4000-48	M4001	M4001-39	M4001-48
14	Air Cell Left Rotation	30323	30323	30323	30323	30323	30323
15	Air Cell Right Rotation	30324	30324	30324	30324	30324	30324
16	Hose Coupling Assembly	30252	30252-39	30252-48	30252	30252-39	30252-48



12 Block Diagram and Wiring Connections



13 Blower Check and Setup

BLOWER CHECK**:** Operation of the blower can be confirmed by connecting a 9V battery to the control signal of the blower. The blower check procedure is as follows:

1) Disconnect blower control wire from Main PCB.
2) Insure the blower power wires are connected to the Power PCB.
3) With the control unit plugged in, attach the negative terminal of the battery to the black wire side of the two pin connector. HINT: Small conductive probes can be inserted into the two pin connector to assist in connecting to the battery.
4) Attach the positive terminal of the battery to the red wire side of the two-pin connector.
5) The blower should run with a 9V signal, and power from the Power PCB. If blower fails to run, verify test setup, check power at Power PCB J1 (voltage should be 120 ± 10% U.S. Domestic). If the Power PCB is functional, and the 9V signal is verified, and the blower does not run, then the blower must be replaced.

BLOWER SETUP: Blowers may require adjustment. Performance of the blower decays over time due to drops or airborne contamination. Filter maintenance is critical to the life of the control unit. To setup a blower, you will need the communication cable, and a small (precision) screwdriver. Upon completion of this procedure the control unit must be calibrated before returning to service. The blower setup procedure is as follows:

1) Using communication cable connect PC to control unit.
2) Use the collect data mode (option “U”) of the diagnostics menu. Command blower speed to “0”.
3) Using small screw driver, adjust the potentiometer (pot) on the blower. The blower should set at the transition from just spinning to no spinning. The blower should not spin at “0”. Adjustment can be done by SLOWLY turning the pot clockwise to decrease speed and counter clockwise to increase the speed. The blower adjustment pot can be found at approximately 7 o’clock on 120V blowers.
4) Once the blower is set, run the blower through command “1”, “2”, “3”,… and “9”. You should hear an increase in blower speed as the blower set point increases.

14 Main PCB Replacement:

Should it be necessary to replace the main PCB (main control board with microprocessor), the following steps must be taken after to set up the unit for service (these steps require the use of the communications cable):

WARNING

- Some components on the main PCB are static sensitive, ESD precautions should be used when handling these devices.

1. The EEPROM must be formatted for use. This is done from the diagnostics menu using the command 'R'. The EEPROM must be formatted before the system can store operating variables and set points.
2. The pressure sensors must be calibrated for the system to operate properly. This is done from the diagnostic menu using the command 'W'. The blower must not be spinning and the mattress must not be attached during the sensor calibration process in order to avoid a false reading.
3. In addition, the unit may also be 'burned-in', or self exercised following significant parts replacement. The 'burn-in' is started from the diagnostic menu using the command 'Z', and entering the desired 'burn-in' in minutes. 24 hours is suggested following main pcb replacement. Execution of burn-in will also clear all recorded service faults.

WARNING

- Pressure sensors must be calibrated after main control board replacement.
- Incorrect polarity or other improper connection of the cable from the display to main control board will result in circuit damage.

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Orchard Park, New York
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1-800-203-4293
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1-591-742-3699